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ABSTRACT

Procedures, guidelines, and decision-making processes for a multimedia course development project in leadership, psychology, and management for the United States Naval Academy are summarized in this Final Report (see EM 010 484 for Part One of the report). The report describes aspects of project management design, covers course content definition, and details the process of defining objectives and the structuring and sequencing rationale. In addition, rationales for strategies, media selection, and instructional systems design are presented, the development and production of instructional materials are covered, and the development and validation of test items are discussed. The report concludes with an analysis of the revision procedure used in the project. Supporting documents include appendixes (EM 010 419), a 12-volume set of test-workbooks (EM 010 420 through EM 010 447), coordinated test items for each content area (EM 010 451 through EM 010 464), a set of coordinated enrichment materials (EM 010 465 through EM 010 472), technical reports and papers (EM 010 473 through EM 010 483, and EM 010 487 through EM 010 500), answer and confirmation sheets to quizzes (EM 010 485), a depth core syllabus (EM 010 486), and content outlines for each area (EM 010 501 through EM 010 512). (SH)

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INTRODUCTION TO PSYCHOLOGY AND LEADERSHIP

T. R. 6-19
20 May 1971

FINAL REPORT
PART TWO
VOLUME ONE

Contract No. N00600-68-C-1525

1

Westinghouse Learning Corporation
Annapolis Division
2083 West Street
Annapolis, Maryland 21401

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20 May 1971

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DESIGN AND OPERATIONAL CHARACTERISTICS OF AN INDIVIDUALIZED COURSE DEVELOPMENT MODEL

FINAL REPORT

PART TWO

VOLUME ONE

Contract No. N00600-68-C-1525

May 1971

Prepared by:

Frank B. Quirk
Project Manager

WESTINGHOUSE LEARNING CORPORATION
2083 WEST STREET
ANNAPOLIS, MARYLAND 21401

T.R. 6-19

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Introduction

The purpose of this report is to summarize the procedures, guidelines, and decision-making processes for a multi-media course development project in Leadership, Psychology, and Management. The project was funded by the Office of Education through the Navy Purchasing Office for work performed at U.S. Naval Academy, Annapolis, Maryland.

This course development effort was one of three contracts granted with the intention of exploring various methodologies for developing a multi-media,individually paced course at a university level. It was intended that the three projects yield both innovative and effective courses and such appropriate documentation for each effort that the educational community would benefit from the labors and the monies that funded these prototype course development projects.

Each project centered on a different type of course commonly found in a university program of studies. The hard sciences were represented by Physics. A project in *Economics* represented those university courses which are less quantitative and rigorous than the physical or mathematical sciences. The soft sciences, which relied most heavily on subjective analysis, was represented by an *Introduction to Leadership, Psychology, and Management*. The intention, therefore, of the overall effort, was to yield appropriate documentation and procedural guidelines for course development efforts across the spectrum of subject disciplines.

This final report, as a summary of the effort to develop an individualized, multi-media course in Leadership, Psychology, and Management, represents a portion of the three year documentation for the development effort by Westinghouse Learning Corporation. It is hoped that the enormous efforts of the project personnel to develop effective procedures for a course development model in a soft science course are adequately reflected in the following pages.

PREFACE - MODELS

When one talks about a model, there is some danger that the lack of a clear definition of that term can cause misunderstanding. For purposes of this report, a brief discussion of models is introduced here and some definitions of the models to be incorporated in this report. In general, modeling can be thought of as being a representation of a system or a part of a system in some form suitable for demonstrating the way the operation or system behaves or may be considered to behave. Additionally, the model should represent a process or endeavor that shows the effects of those factors which are significant. Thus, while the model may not be a mirror image of the actual phenomenon in all respects, it does describe basic inputs, outputs, and operational characteristics. Where appropriate, it provides insight into critical environmental conditions. The representation that a model is cast in may be pictorial, descriptive narrative, qualitative, or purposefully approximate to reality. If possible, it may be mathematical and quantitative. Generally, many have come to think of a model in terms of some schematic drawing or flow chart representing discrete sequencing of processes with clearly definable and replicable input and output items. Still others view a model as a formula for a given operations performance in such detail that the operation can be replicated with no difficulty.

In making a decision to construct a model, one has a number of options to follow. One type of model is the *overall process model*. It tends to be qualitative and often provides a generalized, pictorial representation, a graphic overview of a system. Often it serves as a convenient starting point for more quantitative details. A *functional model* may be a narrative description or outline of functions without indicating the methodology for accomplishing the results. A *procedural model* would describe in sequential fashion a program for all the steps that are involved in the operation of the system. A *performance model* tends to be quantitative in nature, allowing the designer to establish performance criterion necessary to achieve the systems' goals. This type is quite common in engineering where voltage, strain, and stress are precisely detailed for all system components. Time models, such as PERT (Program Evaluation Review Technique), subdivides the total job into clearly specified sub-tasks into related time blocks. Finally, there is a cost model which often graphically projects development or operational costs for a given system.

There are other variations to model building that are determined by their structure. They can be iconic or look alike, analog, or symbolic. Finally, models may be defined by the method employed to achieve a solution. In this classification is the analytic method, numerical method, or a Monte Carlo method.

The reason for this brief excursion into a classification of models is to suggest the wide range of approaches to models and to offer a caveat at this point that the various attempts to define the processes developed for this project are not always in concert with everyone's conception of a model.

With this reservation aside, one can proceed with the justifiable optimism that the details and discussion to follow will represent, with the greatest accuracy possible, the actual processes that comprised the developmental effort for this project. While much of it will be narrative and procedural in nature, it will offer those supportive charts and graphs which would facilitate a comprehension of the process. There are no quantitative inputs and the quantitative outputs are more appropriately discussed at some level of detail in reports listed in Appendix A. Our general aim for this model is that it be both functional and procedural. Where it omits details on exact methodology for accomplishing certain results, it is assumed that professional expertise of the reader can fill in the necessary gaps. However, where possible, the sequential steps involved in bringing this project to its very successful conclusion with all its products, will be detailed. Overall, this report will attempt to define, by any technique available, the significant processes and endeavors which yielded the final course system.

I PROJECT MANAGEMENT DESIGN

Abstract

This section introduces the project development model by concentrating on the organizational characteristics and general management procedures employed in the project. In doing so, it offers an overview of products for the entire project. Additionally, the efforts to implement a PERT system as an ancillary aid to management control, are discussed.

I. PROJECT MANAGEMENT DESIGN

Introduction

Current professional literature is profuse with extensive treatises on design studies as they relate to systems projects or computer operations. The design of any system demands a logical completeness, a consideration and integration of environmental constraints, and a keen eye for auxiliary components and subsystems. Much of the literature has technical areas as subject matter, thus fairly discrete or concrete operations. But there is little on social systems operations. While there is a swelling literature on social systems thinking, theorization, or conceptualization, little is seen on developing and implementing operating systems for social utility. Our purpose here is to outline the operation of a management system for a multimedia development project for a college level course in Leadership, Psychology and Management with the intention of illustrating the dynamics of product development effort.

Initial Tasks

The WLC proposal for the Management Psychology Course was awarded on 26 May 1968, and it can be assumed that one of the contributing factors in this decision was the sophistication of the design elements already incorporated and articulated in the proposal.

In addition to the precise integration of all subsystems for complete contract performance, there were innovative models that promised a major breakthrough for curriculum development - a media presentation and selection model that went beyond a simple or gross comparison of media to an examination and evaluation of those variables that are inherent to media's ability to interact with the learner. The model's premise was that media selection should be based on the appropriateness and educational worth of variables imbedded in each medium, not the medium itself.

Even before announcement of the contract award, representatives from WLC began an extensive orientation to the subject area of naval leadership. Later, they would be aided by the guidance of the USNA project manager, a faculty member of the Leadership committee. Detailed memos were then distributed to the writers and analysts responsible for actual materials development at the Behavioral Systems Group in Albuquerque, New Mexico. Several visits for on-site inspection and orientation were arranged to give first hand awareness of the Academy and the environment of the students using the course materials. Films, books and appropriate naval service documents on regulations and procedures flowed between Annapolis and Albuquerque.

Concurrently, an office was established in the city of Annapolis with the primary function of acting as liaison between the customer and the various agencies of the corporation that would contribute to the project effort. Secondly, the Annapolis office would serve as the systems center for data collecting and processing unit for the project. The initial task for this group was the definition of the data system that would operate for project evaluation and student data analysis.

Management Model

The first model or conceptualization of process to be discussed is project management. This will deal with the overall mechanism which directed and controlled the vatious operations which yielded all the products of the project and the final course system. A suitable starting point is a brief detailing of the project output, which might give a feel for the magnitude and complexity of the project. Figure 1 represents one schematic of the tangible products which emerged from the project. It is labeled a product tree, since it attempts to give a structure to the various products as they emerged in time. However, like any analog, it is not a perfect match. It does, however, represent,

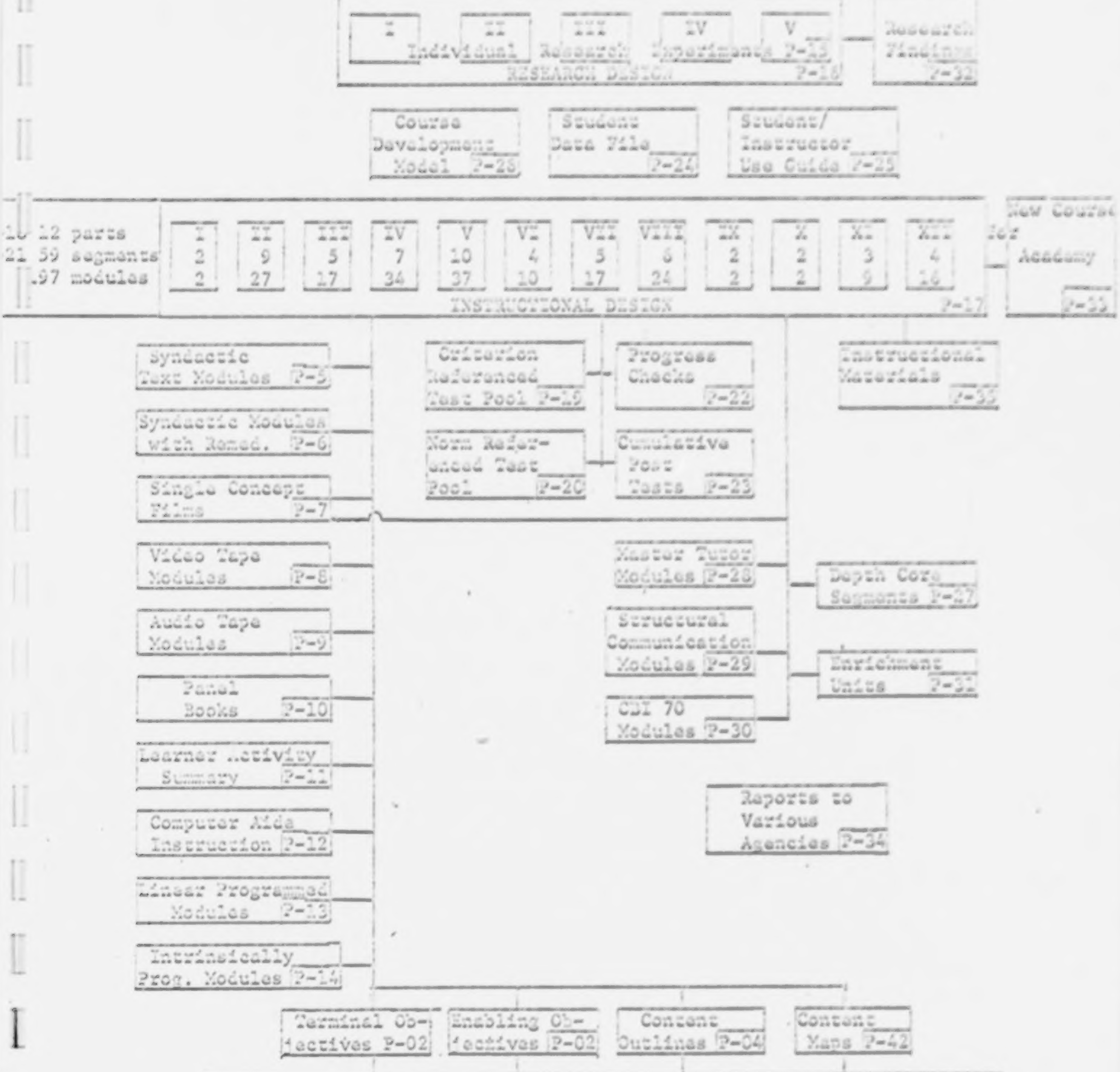
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FIG. 1. Product Tr

from a management point of view, the specific products which would become the visible and demonstrable achievement of management's efforts. Appendix B provides a code and brief details on each of the product numbers, although they are discussed in detail in other sections of this report.

In realizing the generation of these products, the project staff was organized along two lines. Figures 2 represents the project organization as it was generally maintained throughout the course of the project. Like all organization charts, it is illustrative of the various position assignments and hierarchical structure of staff personnel only. However, it does indicate the general makeup of the staff by position.

Table I follows immediately after, with brief summaries of the assigned tasks and function of those positions specified in Figure 2.

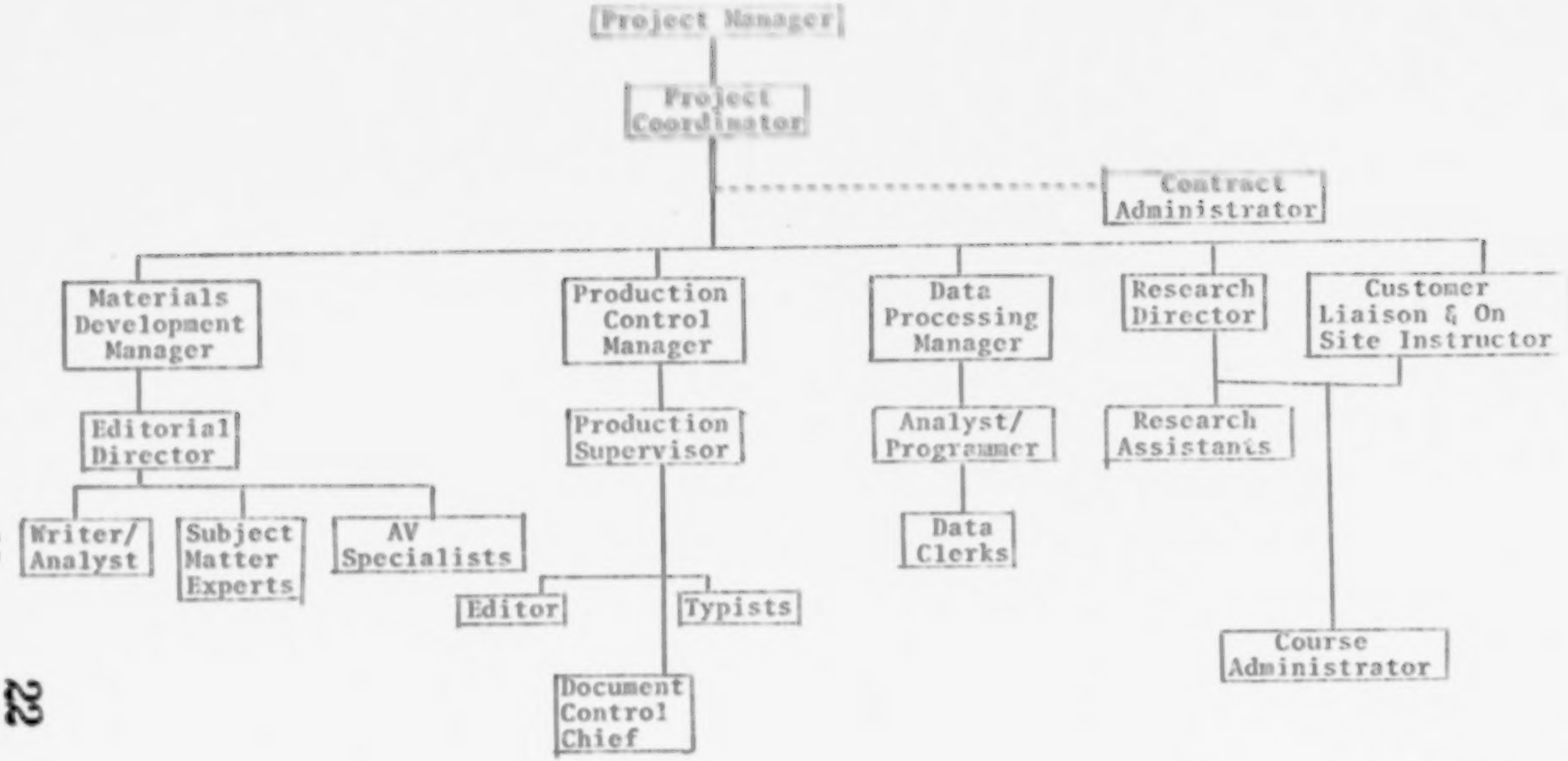

Project Manager
Project Coordinator
Contract Administrator
Materials Development Manager
Production Control Manager
Data Processing Manager
Research Director
Customer Liaison & On Site Instructor
Editorial Director
Production Supervisor
Analyst/ Programmer
Research Assistants
Writer/ Analyst
Subject Matter Experts
AV Specialists
Editor
Typists
Document Control Chief
Data Clerks
Course Administrator

FIG. 2 Project Organization

TABLE 1

Project Personnel - Assigned Tasks & Function

Project Manager	Responsible for the overall work of the project. Specifically functioned as policy maker, planner, director and quality control for all phases of the contract.
Project Coordinator	Although in a staff position, the Project Coordinator was primarily responsible for the day to day articulation between all phases of the project.
Contract Administrator	There was a double role of insuring contract accountability as well as fiscal responsibility as business manager.
Materials Development Manager	The prime responsibility was the development of effective learning materials from initial planning and development through the many revision cycles.
Editorial Director	Functioned in direct control for the development and revision of manuscripts. He specified in detail the standards and specifications for style and editorial procedures.

TABLE 1

Writer/ Analyst	- In addition to the actual writing and revision of instructional materials, their repertoire included sufficient background in behavioral sciences to apply continual analysis of behavioral implication to the learning programs.
Subject Matter Experts	- They provided not only military expertise for appropriate examples, but collectively represented a broad range of subject discipline knowledge in management, psychology, and leadership theory and practice.
Audio-Visual Specialists	- The primary task of the Audio-Visual Specialist was to act as interface between the project personnel and the various outside consultants consisting of artists, TV production personnel, and other audio-visual resource agencies.
Production & Control Manager	- Responsible for the physical production of all materials and their conformity to acceptable editorial and educational standards.

TABLE 1

Production Supervisor	- Usually a chief editor, his job was to insure editorial standards and performance.
Document Control Chief	- This position grew out of a pressing need for centralized control of the many source documents that comprise an ever-expanding editorial file consistently being accessed by all staff members.
Data Processing Manager	- The chief function was the design, development, and maintenance of the data processing system for developmental evaluation, research analysis, and cost accounting.
Analyst/ Programmer	- Detailed and coded the project EDP system and maintained the data files as appropriate.
Research Director	- The prime role was the design, analysis and on-going revision of all research and evaluation measures.

TABLE 1

Customer Liaison & On Site Instructor	In addition to maintaining continual interface with the customer, he was charged with instructional responsibility for the course under development to insure appropriate feedback on effectiveness at that level.
Course Administrator	In conjunction with the On Site Instructor and the Research Director, the Course Administrator was responsible for the day to day operation of the course.

Project Development Functions

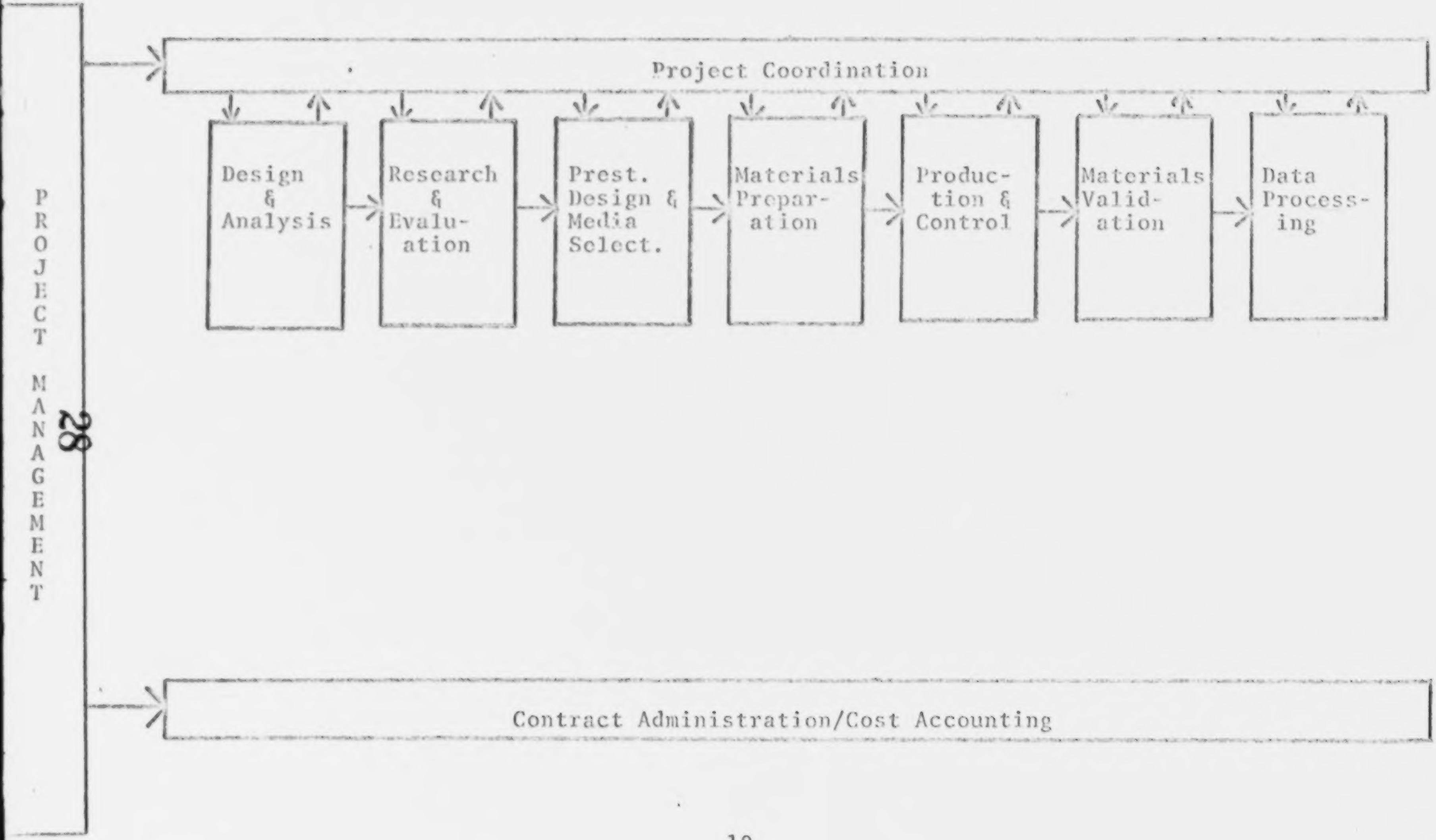
Thus, Table 1 provides a link between the formal organization of the project, as shown in Figure 2, and the eleven functional categories that evolved during the project. These functional categories and their relationship to management is suggested by Figure 3.

This representation together with the previous organization charts and tables represents the management model as it evolved during Phase I of the project, and which has essentially remained the same throughout. The following pages are devoted to three discussions of the eleven functions which comprise the model.

1. Project Management: Functions which fall into this category cover all aspects of internal management and customer interaction.
2. Course Design and Analysis: This category contains functions relating to the systematic analysis of materials and the design of the course and objectives. More specifically, tasks included such activities as acquisition, study and classification of course materials, specification of course content, construction and sequencing of all objectives, interaction with subject matter experts, and coordination with the materials preparation function to insure student attainment of all objectives.

FIGURE 3

Management Functions &
Project Development Functions


PROJECT MANAGEMENT
Project Coordination
Design & Analysis
Research & Evaluation
Prest. Design & Media Select.
Materials Preparation
Production & Control
Materials Validation
Data Processing
Contract Administration/Cost Accounting

3. Presentation Design and Media Selection: This category was partially unique to this contract in the sense that it is usually considered a sub-function of course design rather than an independent function. The development of a separate category was due to the research emphasis in this project. The function of presentation design was not only to specify the optimal presentation design and media for any given objective, but to do so within the constraints of the research design. Tasks in this category included classification of objectives, development of a theoretical rationale for specifying presentation design, developing an empirical application of this theoretical model, specifying the dimensions of presentation design and media selection to be investigated, and careful monitoring of all final course material modules to insure their compliance with original specifications.

4. Materials Preparation and Behavioral Editing: Functions in this category covered all activities relating to the actual preparation of course materials. Specific tasks included construction of all tests, preparation of all film scripts,

slide sequences, lecture scripts, workbooks, texts, and support materials. The behavioral editing function was the most important aspect of materials preparation in that it insured the instructional effectiveness of the material. Behavioral editing was concerned with the continual monitoring of the stimulus response progression. Each discrimination must occur in the appropriate sequence to insure that effective learning will take place.

5. Research and Evaluation: This general function covered the specification and design of the total research effort. Tasks included the specification of student data base elements, specification of the experimental design and statistical analysis, specification of data collection procedures, development of assessment instruments, and interpretation of experimental results in the light of existing research in learning theory and educational psychology. This function was unique to this contract and would not be included in a general model for materials preparation.

6. Materials Validation: One of the necessary steps in the construction of all good instructional materials was the validation or empirical tryout and revision of materials. This functional category covers all aspects of the validation procedure. More specifically, tasks included implementation design, data collection, item analysis of progress checks, error diagnosis of individual frames, and collection and analysis of affective student and instructor responses.

7. Production and Control: This function covered all aspects of materials production and quality control. Tasks include typing and copy editing of all reports and materials, insuring compliance with submittal formats, graphic and packaging design, printing and filming specifications, and all illustrations and art work.

8. Project Coordination: This function would generally be included in the same category as project management. Because of the diversity of the functional categories included in the model, it was believed that a separate coordination function would be necessary. The functions cover general implementation and maintenance of management

decisions. Specific tasks included such activities as the establishment of project schedules and insuring their compliance, monitoring of production and submission of all reports, establishment and maintenance of complete filing and document retrieval systems, maintenance of the cost accounting system, and general interdivisional coordination activities.

9. Cost Accounting: Cost accounting was necessary for maximum efficiency in any project. In addition, the multimedia course development project requires the accumulation of costs by function and task. This is necessary to determine cost effectiveness of the various materials and of the model itself. Specific tasks include the design and implementation of the cost accounting system, development of computer programs to accurately isolate all direct and non-direct labor costs, and the development of a flexible feedback system for all WLC departments involved in the project effort. This category may eventually be assumed under either project coordination or general administration.

10. Contract Administration: This function was similar to that of any long-range contract. Included in this category were all tasks involved in insuring compliance with the contractual agreement that has been established with the customer and direct customer interaction on all aspects of the project effort which affect the cost, scheduling, or other contractual committments.

11. Data Processing: This category actually functioned as support to many of the previously mentioned categories. However, because of the personnel and physical facilities required, this function was generally considered to be procedurally independent. Specific tasks include such activities as establishing a series of data bases and information retrieval systems for the research effort, for the validation of materials, and for systems management. It also included implementation of materials utilizing CAI components.

It should be emphasized that the above were functional categories. They do not necessarily represent responsibility assignments. Often one individual was assigned to two or more categories or vice versa. This distinction is important because it is the functions and procedures which can be generalized to similar projects.

This model was continually revised with respect to four criteria:

1. actual functions performed in each category compared to theoretical functions
2. interactions of functions in each category
3. interdependencies of functions in each category
4. cost-effectiveness of the categories

Manpower Requirements

With respect to manpower types and loadings, Table 2 indicates the various special manpower requirements that existed throughout the course of the contract. Its function is that it be illustrative of the complex manpower requirements given a development effort of this magnitude. For the management model, it represents a personnel resource table.

In reviewing this table, one will note the use of Min/Max headings. This represents the minimum number of personnel employed at any given time in the course of the yearly phase, and the maximum number required at any given point to complete the various developmental tasks. The purpose in using the Min/Max notation is to illustrate

MANPOWER TYPES AND LOADING

	Phase I Min/Max	Phase II Min/Max	Phase III Min/Max
Project Manager	1 - 1	1 - 1	1 - 1
Project Coordinator	1 - 1	1 - 1	0 - 1
Materials Development Manager	1 - 1	1 - 1	1 - 1
Editorial Director	1 - 1	1 - 1	1 - 1
Writer/Analyst	4 - 9	5 - 11	3 - 7
Subject Matter Experts	2 - 5	3 - 6	1 - 3
Audio-Visual Specialists	0 - 3	2 - 2	2 - 2
Production and Control Manager	1 - 1	0 - 1	0 - 1
Production Supervisor	1 - 1	1 - 1	1 - 1
Editors	1 - 3	2 - 6	2 - 4
Typists/Clerks	4 - 12	4 - 15	4 - 15
Document Control Chief	0 - 0	0 - 1	0 - 1
Data Processing Manager	1 - 1	1 - 1	1 - 1
Analyst/Programmer	1 - 1	1 - 3	1 - 3
Data Clerks/Key Punch	0 - 3	0 - 3	0 - 3
Contract Administrator	1 - 1	1 - 1	1 - 1
File Clerks/Typist	1 - 1	1 - 1	1 - 1
Research Director	1 - 1	1 - 1	1 - 1
Research Assistants	0 - 2	0 - 1	0 - 1
Customer Liaison & On Site Instructor	1 - 2	1 - 1	0 - 1
Course Administrator	0 - 0	0 - 2	2 - 2
Consultants			
Content Specialists	5 - 15	4 - 10	0 - 3
Research Specialists	2 - 4	2 - 4	2 - 4
Statisticians	0 - 4	0 - 3	0 - 3
Artists	0 - 4	0 - 6	0 - 2
Audio Visual Specialists	0 - 3	0 - 3	0 - 3
Writers	0 - 6	0 - 10	0 - 5

the broad swing of personnel requirements in a given year for some types of expertise. On the other hand, it illustrates the continuing requirement of other personnel types at a fairly constant level.

In general, the model was quite stable over most of the project, and although there were a number of personnel changes throughout the course of the three year project, the organization, as specified in Figure 2, and the functional activities, as specified in Table 1, remain constant.

Other Management Responsibilities

Another aspect of the management model centers on some specific responsibilities necessary for continuous project performance. They are generally divided into two areas: production responsibilities and environmental responsibilities.

Production Responsibilities

Instructional Materials. This involves the management of production and delivery of the materials generated by the project.

Proposal Contract. This involves monitoring the product development against the proposal specifications.

Product Quality. This involves responsibility for all aspects fo the product quality generated.

Environmental Responsibilities

Budget. This involves reviewing performance against projected costs, in form and figures.

Staff Morale. This involves keeping everybody happy (if that is their best state) and willing to work.

Interagency Cooperation. This involves seeing that the atmosphere between agencies involved is as good as possible for productivity.

Staff Hiring. Staffing the project with people who will work efficiently.

Intraagency Cooperation. This involves keeping those within the project in the same state aimed at in Staff Morale.

Project Accountability. This involves seeing that the project meets its commitments.

These responsibilities are ordered in a network shown in Figure 4, which attempts to link those responsibilities just cited in graphic organization. Generally, these items are an attempt to delineate some of the more intangible aspects of the management effort. There is no attempt here to discuss those procedures which

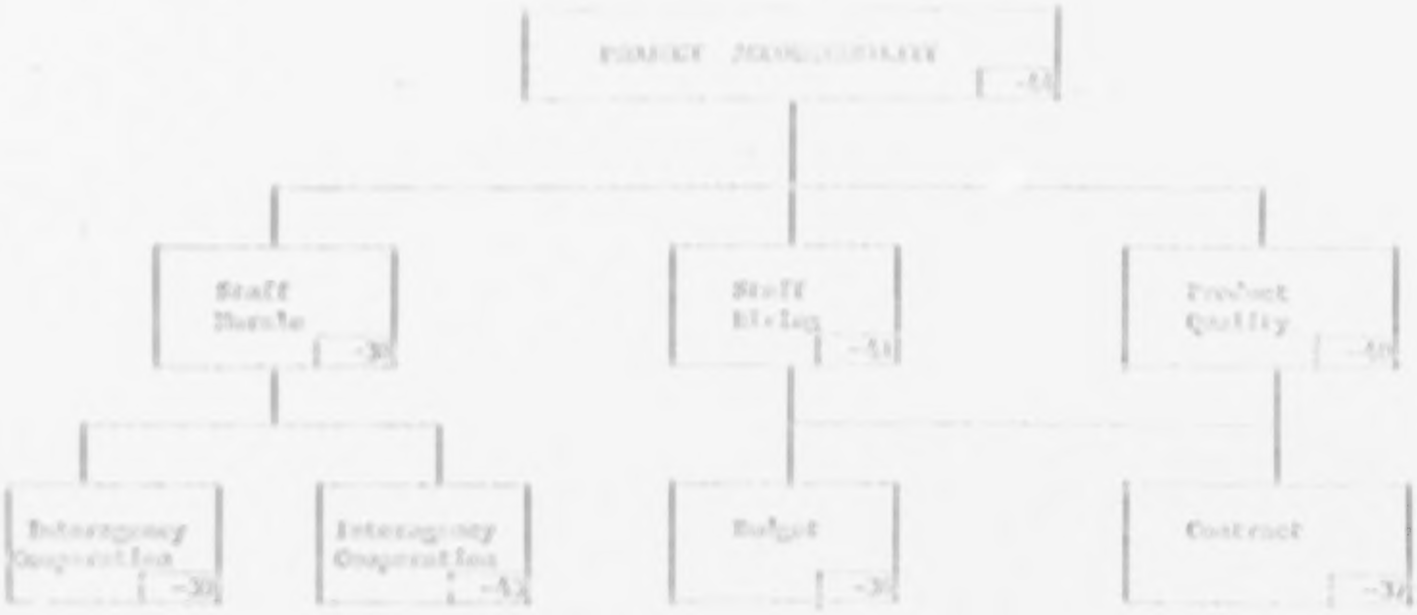
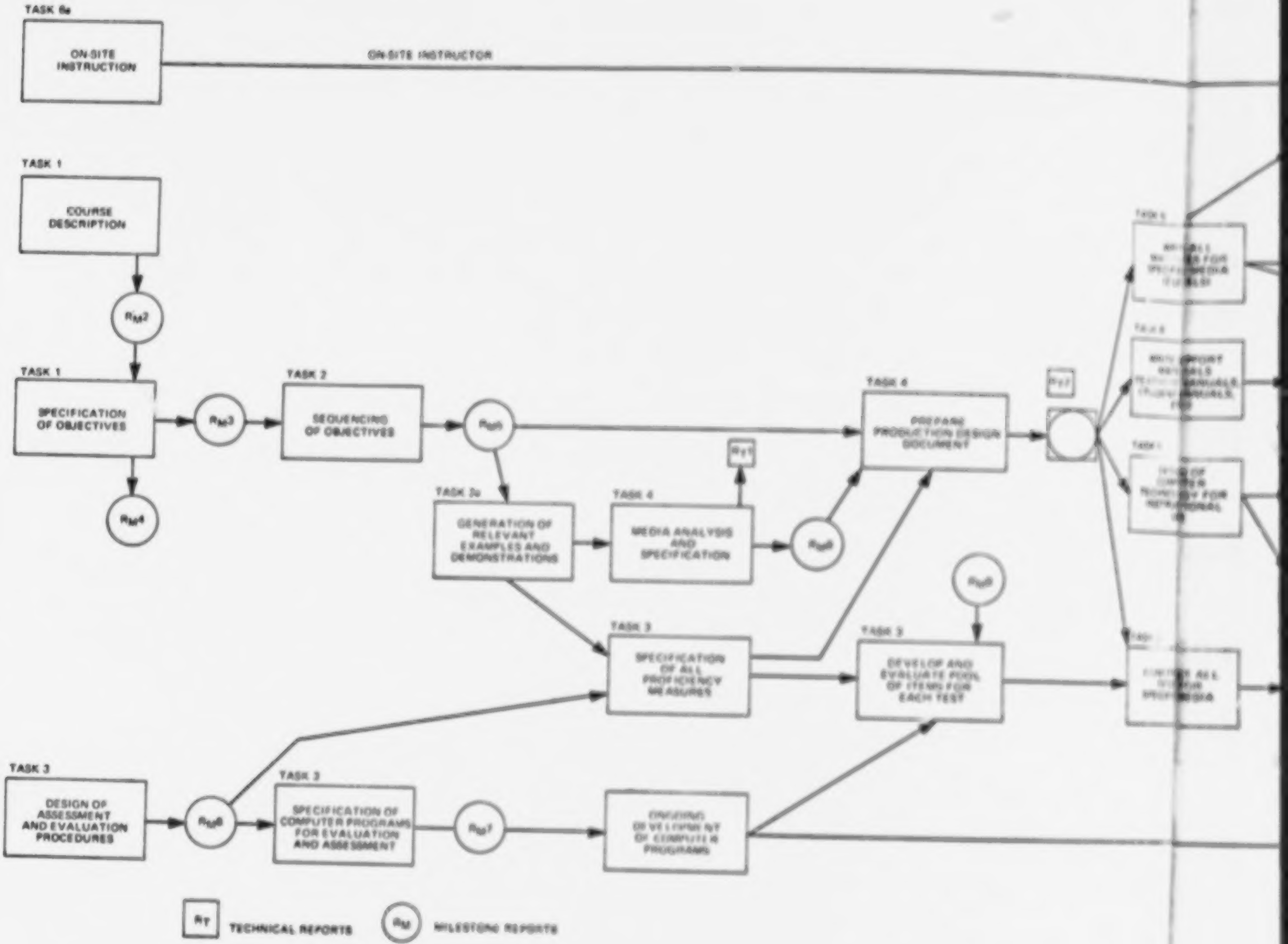

PROJECT
Staff
Morale
-30%
Staff
Hiring
Product
Quality
Interagency
Cooperation
-30%
Interagency
Cooperation
Budget
Contract

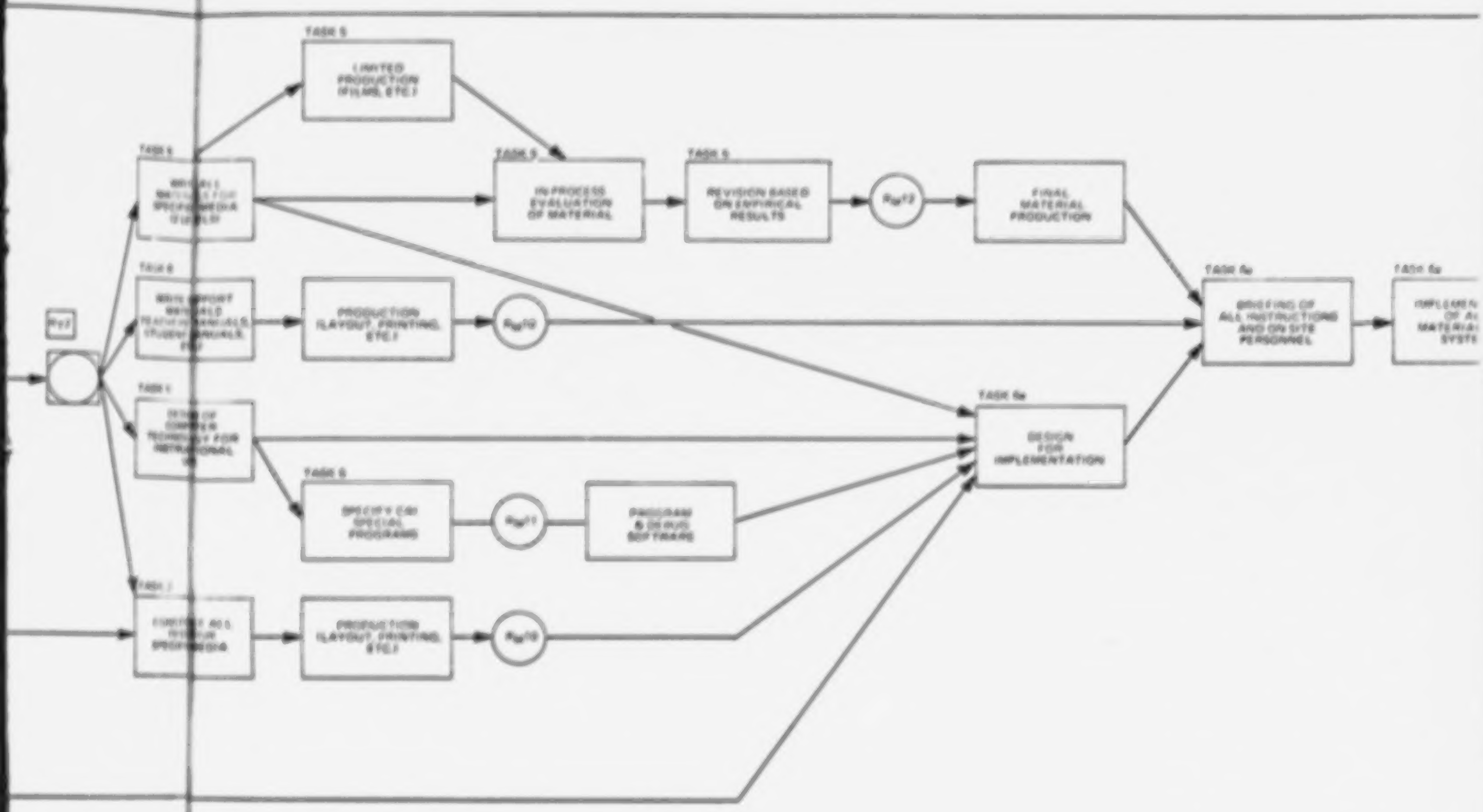
FIG. 4. Management responsibilities network.

resulted in the maintenance of morale, cooperation, etc. Their listing, however, suggests that the management model must be concerned with those intangibles which grow out of people working together. It should be emphasized, as one example, that product quality is quite different from products per se, and that one of the functions of management is to delineate the various tolerance levels for acceptable performance in addition to specifying the overall criterion for a worthy product (i.e., each product should not only be acceptable to the customer, but should exhibit those characteristics which makes it acceptable enough to bear the company hallmark without reservation).

General Product Planning and Coordination

The work flow chart, Figure 5, represents a critical path work flow which was the basic management tool for insuring total project coordination of all product tasks. This work flow chart also served as the input to the PERT analysis and control unit discussed later in this section.


TASK 6a
ON-SITE INSTRUCTION
ON-SITE INSTRUCTOR
TASK 1
COURSE DESCRIPTION
RM2
TASK 1
SPECIFICATION OF OBJECTIVES
RM3
RM4
TASK 2
SEQUENCING OF OBJECTIVES
RM5
TASK 2a
GENERATION OF RELEVANT EXAMPLES AND DEMONSTRATIONS
TASK 4
MEDIA ANALYSIS AND SPECIFICATION
RT1
RM8
TASK 6
PREPARE PRODUCTION DESIGN DOCUMENT
RT7
TASK 3
SPECIFICATION OF ALL PROFICIENCY MEASURES
RM9
TASK 3
DEVELOP AND EVALUATE POOL OF ITEMS FOR EACH TEST
TASK 3
DESIGN OF ASSESSMENT AND EVALUATION PROCEDURES
RM6
TASK 3
SPECIFICATION OF COMPUTER PROGRAMS FOR EVALUATION AND ASSESSMENT
RM7
ONGOING DEVELOPMENT OF COMPUTER PROGRAMS
RT TECHNICAL REPORTS
RM MILESTONE REPORTS



TASK 5
LIMITED PRODUCTION (FILMS, ETC.)
TASK 5
IN-PROCESS EVALUATION OF MATERIAL
TASK 5
REVISION BASED ON EMPIRICAL RESULTS
FINAL MATERIAL PRODUCTION
TASK 6
PRODUCTION (LAYOUT, PRINTING, ETC.)
TASK 6a
BRIEFING OF ALL INSTRUCTIONS AND ON SITE PERSONNEL
TASK 6a
DESIGN FOR IMPLEMENTATION
TASK 6
SPECIFY CAI SPECIAL PROGRAMS
PROGRAM & DEBUG SOFTWARE
PRODUCTION (LAYOUT, PRINTING, ETC.)

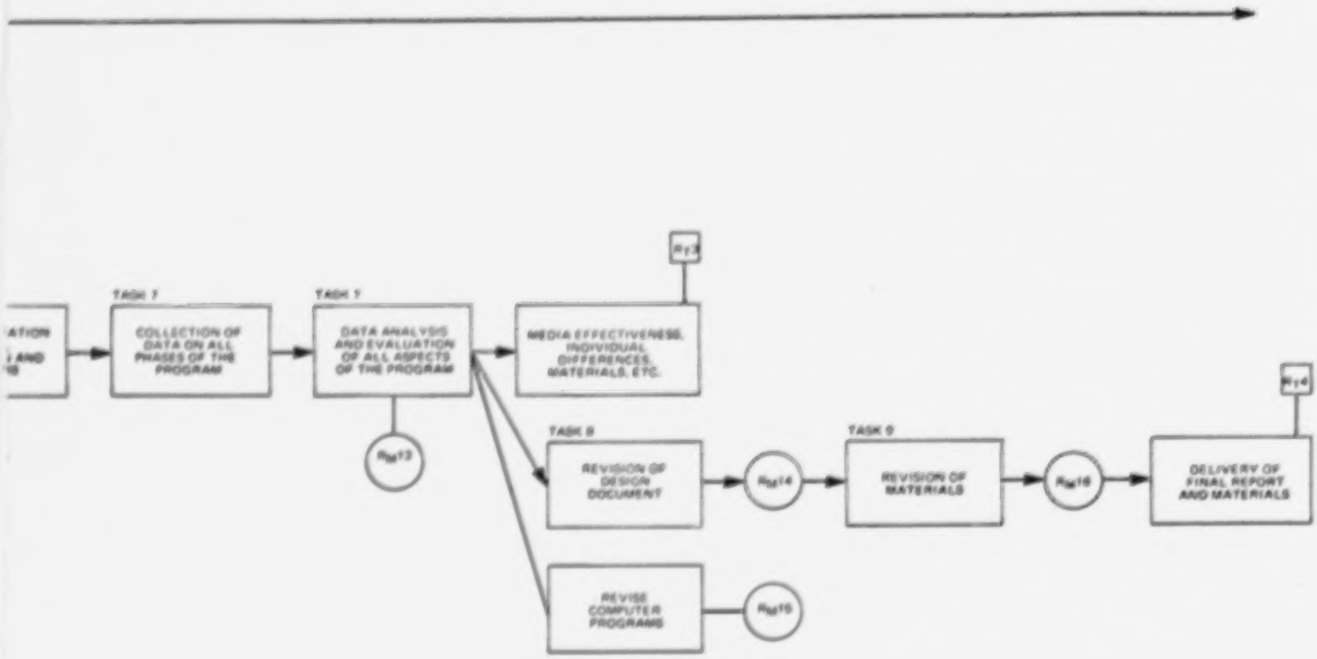

ATION
AND
TS
TASK 7
COLLECTION OF DATA ON ALL PHASES OF THE PROGRAM
TASK 7
DATA ANALYSIS AND EVALUATION OF ALL ASPECTS OF THE PROGRAM
R_M13
R_T3
MEDIA EFFECTIVENESS, INDIVIDUAL DIFFERENCES, MATERIALS, ETC.
TASK 9
REVISION OF DESIGN DOCUMENT
R_M14
TASK 9
REVISION OF MATERIALS
R_M16
R_T4
DELIVERY OF FINAL REPORT AND MATERIALS
REVISE COMPUTER PROGRAMS
R_M15

Figure 5. WORK FLOW CHART

Time Frames and Schedules

Any discussion of times frames, schedules, and slippages at a detailed level would have no purpose for this management model. It is possible, however, to demonstrate the relative schedules or the various activities over a time span of three years. The schedules shown in Figure 6-1, 6-2, and 6-3 indicate the schedule as originally devised at the beginning of the contract. While there were some alterations to this basic, total schedule, in retrospect it still serves as a clear model for allocation of tasks on a temporal basis. These figures, in conjunction with Figure 1, indicate the relative relationship and sequencing of all phases of product development.

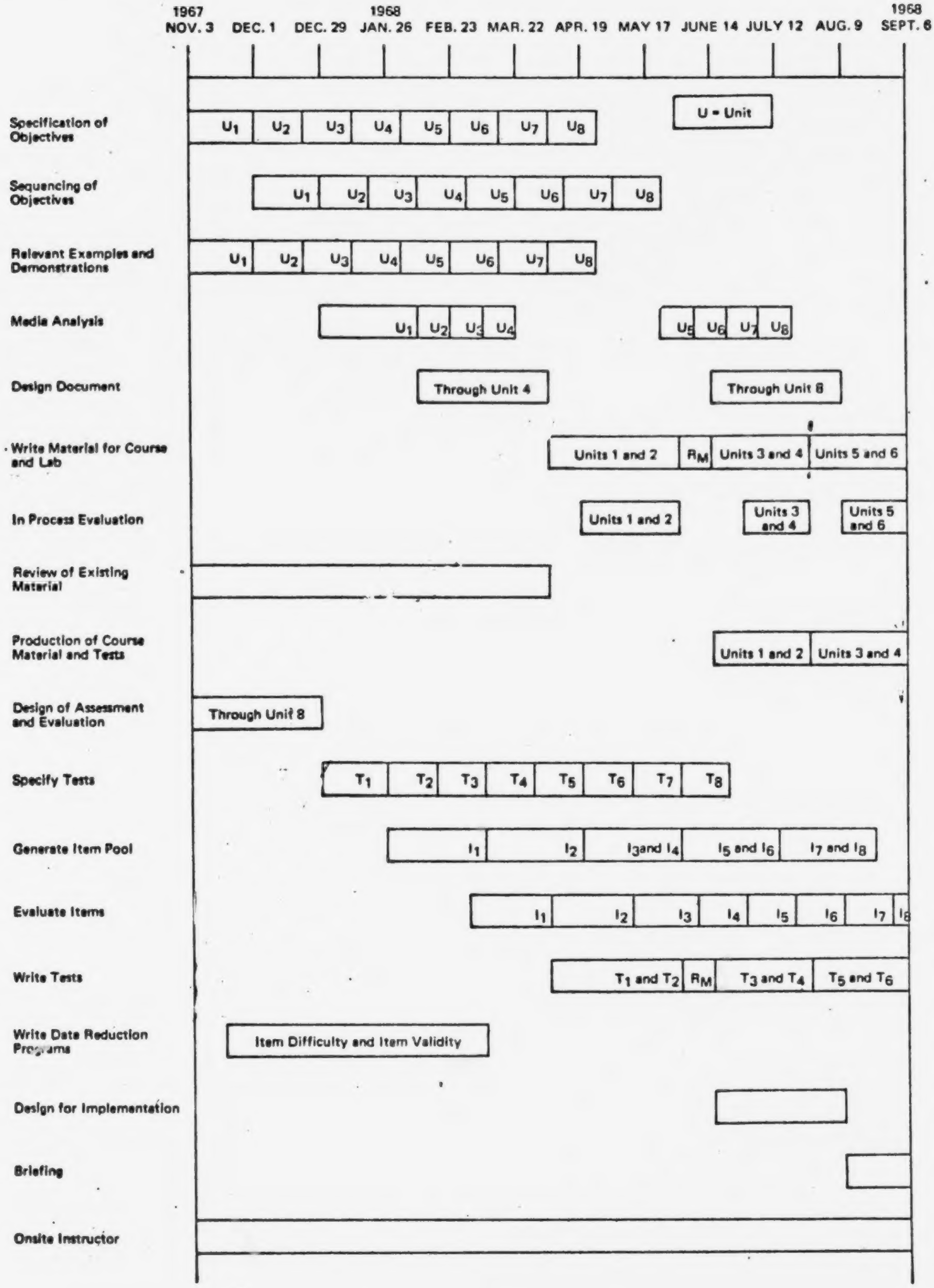


Figure 6-1. Temporal Allocation of Tasks During Phase I

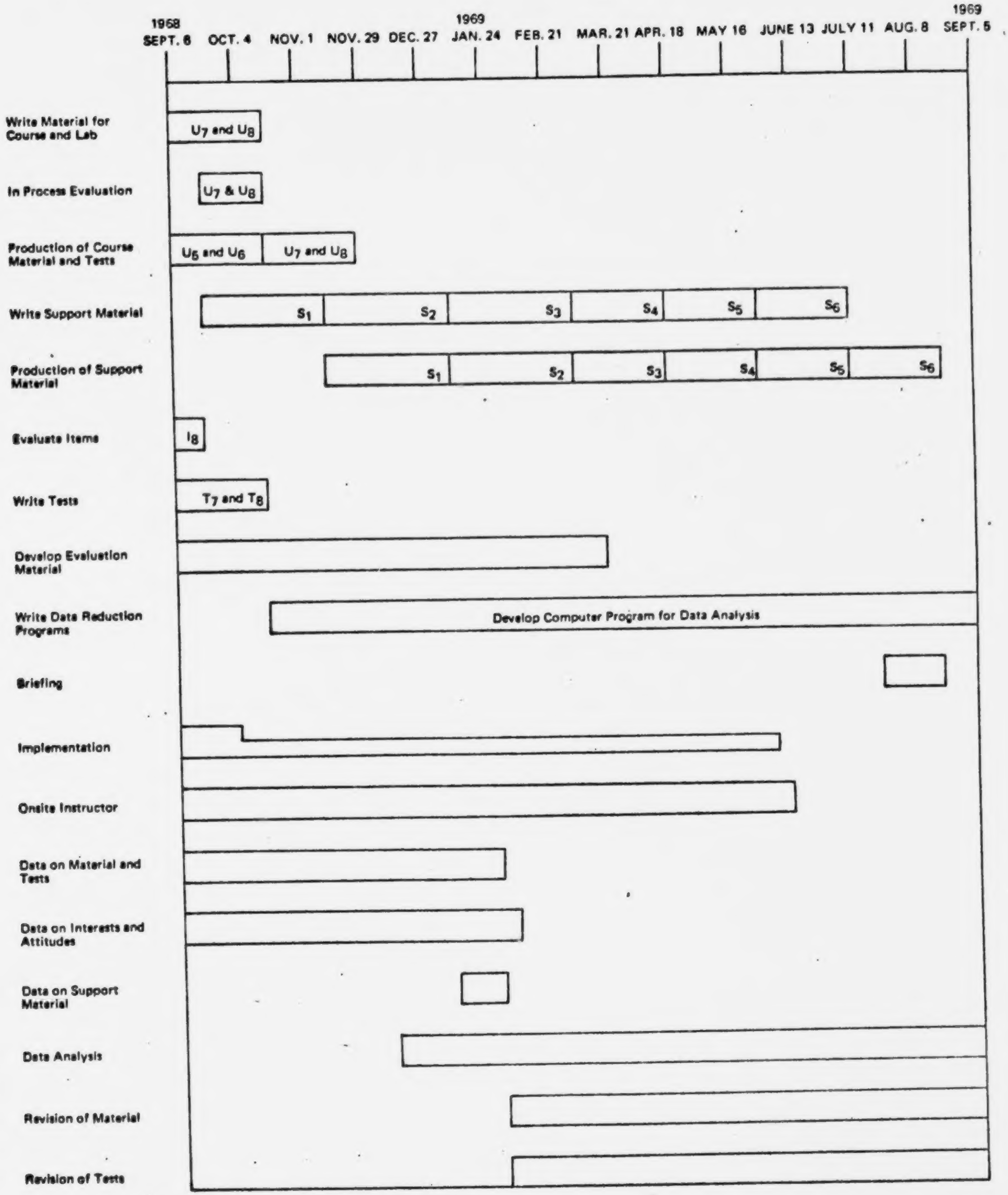


Figure 6-2. Temporal Allocation of Tasks During Phase II

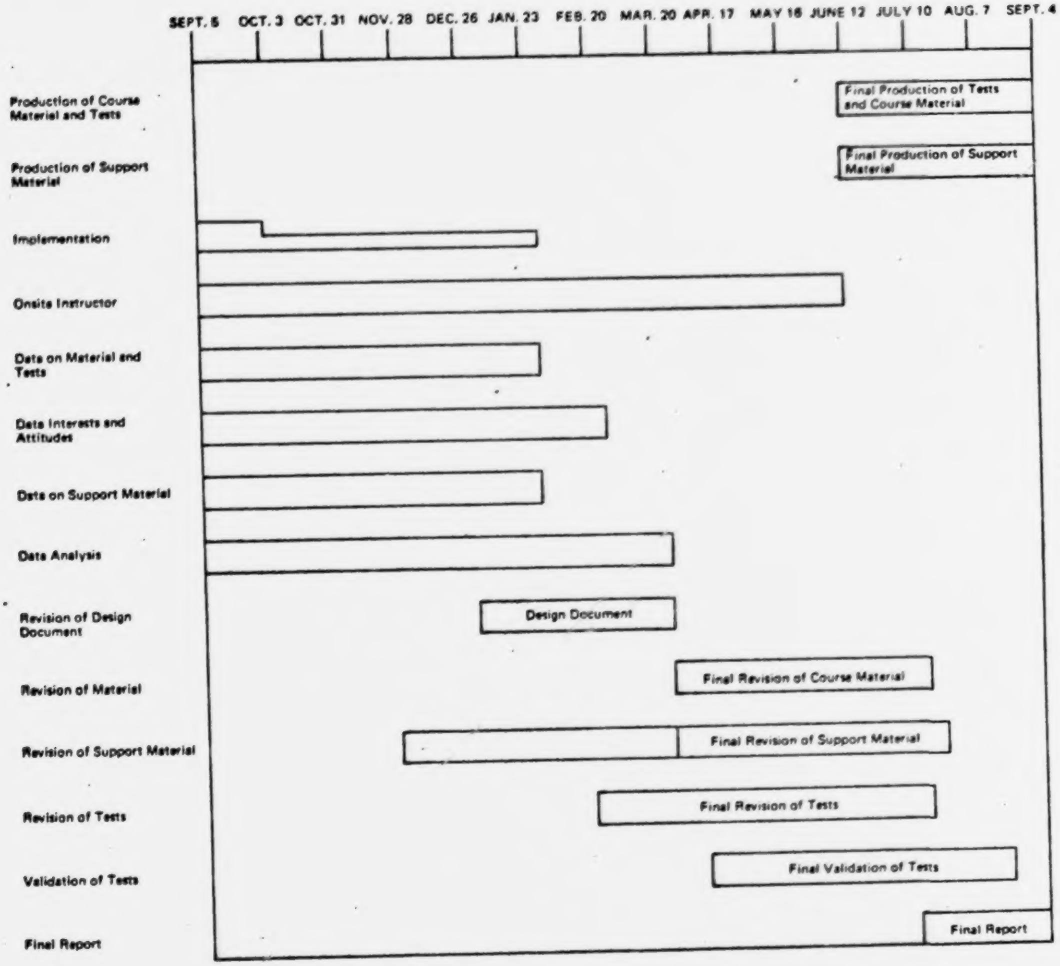


Figure 6-3. Temporal Allocation of Tasks During Phase III

PERT Analysis and Control

There was a concerted effort to test the feasibility of modern management tools for determination of:

- time estimates for completion of any and all parts of the project.
- resource requirements (manpower and other resources) for any and all parts of the project.
- the effect of schedule shifts or delays on resources, project costs, and delivery dates.
- the effect of variation in sequence or inclusion of project tasks on resources, schedules, and project costs.
- on-going performance evaluation which could be used to continually readjust resources, time, and cost estimates for the project.

It was decided that the PERT time system could best be adapted to form the basis of the planning and control systems for the multimedia project.

The PERT system, initially developed in 1958, has proved to be a useful tool in planning and evaluating projects in development and construction. Most of these projects have been concerned with the development and construction of weapons and military materials.

While the computerized PERT system could not be maintained throughout the project, the effort to detail the inputs into the system served as the basic strategy for isolating tasks, establishing their interdependency, and maintaining control on the project activities. The recommendation, therefore, is that PERT analysis is a vital element for a course model development and is discussed here in some detail.

The application of such a system to any research and development project is based on the presumption that sufficient experience with the activity exists to permit the activities involved to be identified. Since many similar systems have been used extensively for efforts in technical writing and materials preparation, considerable information was available for the establishment of a large portion of the procedural steps involved in the project. On the other hand, many of the research activities were relatively new and no adequate systematic outline of procedures had been developed to serve as a model for the project. In general, developmental projects in education and projects which are primarily concerned with research in any field have not been reported in sufficient quantity to establish a generalized procedural model.

It was believed, however, that a careful analysis of the work necessary for the accomplishment of each milestone would lead to the development of a general list of procedural steps. It is important to note that regardless of how well (or ill) defined the work tasks are, deviations from the general model will occur.

Developmental activities are relatively new to the field of education. The problem involved in the multimedia contract was the production of a particular kind or type of product, from the initial planning stages through the development of prototypes which can be used for future production models.

The research aspect of the project can be divided into three major areas: (1) evaluation, (2) experimentation, and (3) validation.

The general nature of the evaluation research involved the use of existing data and the collection of new data to answer specific questions and hypotheses. Attempts were made to secure valid and reliable information from the USNA files, by the careful examination of historical records and contemporary progress reports. Additional data was collected by an extensive testing program at the USNA. In developing the network of activities associated with the development and compilation of student data, the development of the original hypotheses was among the first steps taken.

The unique aspect of this project was the interdependency between the experimental design and the development of course materials. In order to evaluate the effects of various media and presentation design elements on the student's learning style, it was necessary for the research design to set the parameters for the development of the materials. For this reason, interaction between the two major paths of the network was required in all phases of the project.

The accuracy of any management system is a function of the precision and clarity of the original work specifications. The total project must first be defined and then subdivided into a series of major units of work. Each of these units represent milestones of accomplishment toward the completion of the project. Milestones represent key network events that are necessary to achieve the total project objectives.

The PERT system included two major cycles: the planning cycle and the implementation and control cycle. The planning cycle included:

- definition of project objectives.
- specification of milestones for the project.
- breakdown of tasks.
- further breakdown within organizational departments.
- definition of resources.
- development of a cost-accounting system.
- construction of the networks.
- estimation of time and resources for each task.
- development of delivery schedules for all milestones.

The implementation and control cycle includes:

- development of all data processing requirements.
- implementation of cost-accounting system.
- comparison of actual expenditures in time and resources to projected expenditures.
- updating of PERT network.
- revision of schedules and budget.

1. Definition of Project Objectives

The first step in developing the PERT management system was to define the objectives of the project. These objectives included a statement of all deliverable documents for the contract. To accomplish this step, a careful review was made of the proposal, the "Multi-media Course Development Paper", the "Program Data Book", and all other written and verbal communications between WLC and the USNA.

The multimedia course development project had three major objectives:

a. The development of a multimedia course in leadership for the USNA. This course was to include the most recent advances in the field of educational technology and was to be fully validated in the classroom.

b. A comprehensive research program to evaluate the effectiveness of various media and presentational forms with respect to variables including cost, student achievement, and administrative difficulties. Relationships between individual learning styles and subsequent performance in the instructional environment were to be carefully studied.

c. The primary long-range objective was the design, development, and verification of a model which could be used for the development of a superior educational system.

2. Specification of Milestones

The major milestones were initially defined as:

(1) the research and evaluation plan,

(2) the content outline,

(3) the terminal objectives,

(4) the enabling objectives and test items,

(5) the presentation design,

(6) the segment documentation packages, and

(7) the actual material.

In addition, progress reports were to be submitted monthly and quarterly. Additionally milestones were believed to be important for the fulfillment of the contract objectives, but were not part of the critical path for the workflow of course construction and the research effort. These milestones include:

(1) the development of a cost-accounting system,

(2) the development of a rationale for media selection,

(3) the development of the rationale for sequencing, and

(4) a series of technical papers which included topics such as course description, course strategy, course development model, and cost effectiveness.

3. Breakdown of Tasks

The specification of tasks served as the basis for construction of the PERT network. The actual task breakdown began with the construction of the course development model. The development of this model and the task definition began at the most general functional level. The subdivision of the functions continued until a level was reached at which the complete resource requirement could be completely specified. All tasks necessary for the accomplishment of each milestone were delineated. Care was taken to ensure that these tasks were consistent with the work statements presented in the original proposal.

After the tasks were specified, their interrelationships were defined.

Up to this point, the relationships between the course development model and the structure of the PERT network were quite similar. At this point, however, it was necessary to assign responsibility for the specific tasks to departments or units of operation in the customers' organization. From this point on, the development of the PERT network began to reflect the organizational structure and specific resource availability of the customer and, therefore, deviated from the general model.

4. Task Breakdown Within Organizational Departments

Each department in the organization identified a number of steps within any task that was assigned to it.

Another variable which influenced the extent to which the steps in any task were identified was the number of departments and different personnel in the contractor's organization which were responsible for the accomplishment of that task. For example, the drafting of a report was usually broken down into two smaller steps -- editing and typing -- for assignment of responsibility to different sections. On the other hand, the development of test norms, which was a much larger task, was not broken down since the responsibility for the various steps involved rested with a single section in the contractor's organization.

As the structure of the step breakdown is defined, the interfaces between any of the various steps should be identified. Interfaces are defined as the transfer of information from one part of the network to another.

5. Definition of Resources

Closely related to the breakdown, with respect to organizational structure, is the definition of resources.

These categories included: editor, secretary, project coordinator, writer, analyst, illustrator, research assistant, research associate, production and control manager, and subject matter expert. For each step in the network, the number of man hours required for each resource was specified.

After the specification of resources and man hours had been completed, manpower loading for any given project-day was determined. Charts showing the overall requirements for each of the professional resources were developed.

These charts were analyzed by the management of each department to shift resources in order to alleviate the problems of excessive manloading or manpower. Highly irregular loading patterns would indicate a need for additional hiring, overtime, or possibly a rescheduling of the activities listed in the PERT network.

6. Development of a Cost-Accounting System

One aspect of this system which was alluded to, but not presented in its entirety, was the relationship of the cost-accounting system to the PERT network.

The code structure for the accounting system was devised in such a way that costs could be isolated for any professional resource (limited to the ten previously mentioned) working on any step in the network. This aspect of the project was necessary for the feedback, updating, and control of the system.

All costs could be summarized with respect to any given milestone, resource, or organizational department. In this way, the actual man hours spent for any activity could be directly and immediately compared to the projected hours for that activity. Variations in the actual and the projected man hours served as a basis for revisions of projected costs and milestone schedules.

7. Construction of the Network

The network was the graphic representation of the project plan: It showed the plan, which had been established to reach each milestone, along with the interrelationship and interdependence of the project steps.

A network was composed of events and activities. Events is the term used when referring to the start or completion of an activity. These do not consume time or resources. Events are points in time which signal the initiation or completion of an action.

8. Estimation of Time and Resource Requirements

As previously mentioned, the resources or man hours were specified for each step or activity in the project effort. This, of course, directly effected the times which were assigned, but did not completely determine them.

Once the time estimates for each step were determined, the longest time path through the network was calculated. This path is called the critical path, since the total project time is dependent on this path.

Although only one estimate of time was used, the fixed beginning and termination of the contract allowed for the computation of slippage time. The time required for the completion of the critical path was calculated forward from the initial date and backwards from the termination date of the contract. This calculation yielded the maximum amount of "slippage" time that could occur without affecting the final delivery date, as specified by the contract.

9. Development of Delivery Schedules

By analyzing the manpower loadings and the total worktime required for each activity, the delivery schedule from each milestone was developed. Initially, three times were indicated for delivery of each milestone.

They were:

- delivery to USNA.
- return to WLC with recommended revisions.
- final delivery to USNA.

All three times were indicated on the schedule because the amount of turn-around time allotted for the USNA to review materials was critical to the completion of the contract.

The PERT management network represented an ideal system for the planning and control of the project. During Phase I, it became increasingly evident to WLC that the use of the PERT system for allocation of resources and estimation of deadlines was decreasing in effectiveness. After a careful examination of the project, there appeared to be three factors which continually caused problems in the management of the effort and eventually led to the formal abandonment of the PERT/cost system, although the analysis had yielded the basic methodology for management that would remain throughout the project.

1. A management system such as PERT assumes that all activities can be assigned reasonable estimates of time and resources. It also assumes that all activities can be brought under the control of the contractor by manipulating the resources or time involved. In most developmental projects where

PERT has been used successfully, the interaction with the contractor, i.e., review points, occurs at the termination of a long chain of activities. In a materials development project such as the multimedia project, continued interaction with the contractor and "small step" approval was required. One way to look at this problem is to consider the difficulty that would occur if one department in an organization was not scheduled by the PERT system but had a vital part in the development of the materials. The requirement for continual interaction with the customer and multiple sign-off points made the accurate specifications of the customer's time on the project essential. Without this control, the careful scheduling of resources and time around undefinable blocks of time was not feasible.

In order to efficiently schedule a project of this type, a contractual agreement would need to be established which would specify the amount of total turn-around time, including specifications, necessary for each submittal. The establishment of such events, prior to the project start, would be advantageous to both the customer and the contractor.

2. A second problem which served as both the major reason for the development of the PERT system and the major reason for its formal abandonment was the milestones. In almost every case, the approval of one milestone was necessary before the work on the following milestone was begun. This requirement, in combination with a limited time deadline, posed a major problem for both the contractor and the customer. For example, the course outline served as a basis for the terminal objectives, which in turn served as a basis for the evaluating objectives, etc., on through the presentation design, segment documentation, and materials preparation. Therefore, the approval of the course outline was essential for work to progress from the contractor's point of view. The customer, however, was hesitant in making a hasty decision on a document which would serve as a basis for the entire project. This problem was never resolved. Consequently, milestones were not approved and dependent milestones were delayed. The first milestone of the project, the content outline, was informally submitted in August, 1968, and after multiple revisions, it has not yet been completely approved, as of the writing of this report, April, 1971.

When this type of dependency relationship is inherent in a project, an agreement should be reached between the customer and the contractor as to the maximum time allotted for approval and revision of critical milestone delivery dates.

3. The management system developed for a specific project is a function of the precision and clarity of the original specification of the work to be completed. Because of the lack of clarity of the initial contract, the PERT network was based on milestones which the contractor believed to be the best representation of the customer's requirements; however, agreement was never officially reached as to the items which would constitute total delivery for the project. This lack of detail on project products, which formed the basis for the PERT network, caused major changes in the actual path of the system. Since this type of change could not be handled by the data processing program, the man hours required for rescheduling all activities became prohibitive. The major value of the computerized system was lost when deviations from the initial path were so extensive that they could not be automatically updated.

The solution to this problem is simple in theory, but difficult in practice. A clear statement of the work to be accomplished and the milestones to be reviewed by the customer should be included in the contractual agreement.

This brief summary of management design considerations has attempted to introduce the development model by indicating the basic framework of operations. Since the management aspects of the project are difficult to discuss separately from the substantive operations, it is hoped that the management requirements for each step of the developmental effort will become more increasingly clear in successive chapters. Nonetheless, this chapter on management aspects of the project suggests that developmental course systems are costly in manpower, which always absorbs the greatest portion of any budget. Secondly, that the complexity of the operations requires managerial skills that will effectively channel all the diverse technical competencies.

Lest these considerations seem too formidable for those who would wish to replicate the process for their own development efforts, it should be noted that this project functioned as a prototype to explore and analyze developmental procedures in detail. With the lessons learned, or more precisely, with the map charted, replication of the effort for some other course is possible within a smaller time frame, and with reduced costs.

The competencies, however, can never be reduced or taken for granted. And management competencies are absolutely vital to success of a course development project.

II COURSE CONTENT DEFINITION

Abstract

This section of the report discusses the procedures and problems in defining content for the course in an *Introduction to Leadership, Psychology, and Management*. It concentrates both on the evolution of the content definition process and the contending points of view which made this portion of the course development activity the most troublesome.

II. COURSE CONTENT DEFINITION

The course, An Introduction to Psychology and Leadership, is an introduction to the theory and techniques of Naval leadership developed through the principles of psychology and management. It presents the principles of the behavioral sciences which are pertinent to understanding individual and group behavior of adults. It introduces midshipmen to the management process and the relationship of management functions to leadership. The course presents the generally recognized techniques of effective leadership which can assist the Naval officer in analyzing, predicting, and influencing the behavior of his subordinates.

The overall objectives established for the course were:

1. to develop in midshipmen a knowledge of those principles of the behavioral sciences which are pertinent to an understanding of the individual and group behavior of adults, and to develop an awareness of the applicability of these principles to Naval leadership.
2. to teach the generally recognized techniques of effective leadership which can assist the Naval officer in analyzing, predicting, and influencing the behavior of his subordinates.

3. to introduce midshipmen to the management process, and to inculcate in them an understanding of, and an ability to use, the human relations aspects of that field as it relates to Naval leadership and to the duties of a Naval officer.
4. to develop in midshipmen the ability to use the fundamentals of psychology, management, and leadership in the analysis and solution of leadership problems.

Topics Covered in the Previous Course

The following is a list of general topics covered in the previous Introduction to Psychology and Leadership course.

1. What Psychology Is and Does - Behavior as Adjustment
2. Development of Behavior Leadership Growth
3. Clinical Approaches to Personality
4. Psychometric Approaches to Personality - Basic Statistics
5. Psychometric Approaches to Personality
6. Defining and Measuring Learning and Retention
7. Management of Learning and Retention
8. Observation and Action (Perception)
9. Thinking and Deciding
10. Motivation and Drive
11. Emotion
12. Reactions to Frustration
13. Mental Health and Therapy
14. Leadership and General Order 21

15. The Individual and the Group
16. Interpersonal Communications
17. Effective Leadership
18. Leadership Basis
19. Leadership Behavior and Styles
20. Authority and Responsibility
21. Cohesion (Morale, Esprit de Corps, Discipline)
22. Introduction to Management and the Management Process
23. Planning and Objectives
24. Organizing and Coordinating
25. Directing and Controlling
26. Counseling - Interviewing
27. Personnel Evaluation

Goals of the Course

Thus, the goal of the course was to teach midshipmen the skills and attitudes necessary to lead men effectively. These skills were:

1. to plan the mission, assignment, or operation effectively, using good management practices.
2. to realize that effective leadership depends on the credible image of the leader.
3. to accept moral responsibility for the welfare of the Navy and the United States (special trust and confidence).

These broadly stated objectives are quite similar in tone to the mission of the Naval Academy and to the goals stated in General Order 21.

By the nature of the contract, the experimental course would differ from the existing course in its presentational form. Aside from this, the emphasis of the new course would differ in several key ways from the present course. The differences were stated as follows:

1. The experimental course would place a heavy emphasis on the 41 Critical Behavior Categories of NAVPERS 9224A and the film, General Order 21.
2. The constituent concepts of leadership would be derived from management and psychology principles, rather than merely related to management and psychology.
3. The thrust of the new course would be toward visible behavior applied, rather than toward simple cognition.
4. The new course would require that midshipmen apply the rules and principles of leadership to solve problems.

5. The experimental course would use mixed-media to facilitate the simulation of real life situations.

6. The course would allow the student to obtain the objectives on an individually paced schedule.

In developing this course, the contractor took the following perspective:

> Effective Naval leadership is based on the successful application of psychological and management principles through appropriate behavior of the leader during times of emergency, during periods of training, and during everyday interaction with senior and subordinate personnel. Leadership is inferred from the visible, and often measurable behavior of those being led. When leadership is present, men will behave in ways quite different than when it is absent. Effective leadership allows the leader to predict and control the behavior of individuals within the group. An effective leader must be able to identify and diagnose instances where leadership has its own effectiveness in directing men toward the accomplishment of the Navy's mission.

Initial Course Outline

The content for the experimental course had been tentatively divided into eight major areas. These areas were outlined as follows:

- 1.0 Characteristics of Individual and Group Behavior
    - 1.1 Science and technology
    - 1.2 Psychology as science
    - 1.3 Behavior
    - 1.4 Laws of behavior
- 2.0 Self-Direction, Self-Motivation, Self-Control, Image
    - 2.1 Naval expectations
    - 2.2 Self-expectation
    - 2.3 Attaining goals
    - 2.4 Setting goals for yourself
- 3.0 Supervision and Motivation of Subordinates
    - 3.1 Leadership and supervision
    - 3.2 Leadership psychology research
    - 3.3 Procedures for motivating subordinates
- 4.0 Discipline and Morale
    - 4.1 The concept of discipline
    - 4.2 The concept of morale
- 5.0 Relations with Superiors and Peers
    - 5.1 Formal
    - 5.2 Informal
    - 5.3 Rationale
    - 5.4 Techniques

6.0 Organization, Selection and Administration
  6.1 Management - an overview
  6.2 Organization
  6.3 Selection
  6.4 Administration
  6.5 Decision making and problem solving
7.0 Communications, Counseling and Personal Relations
  7.1 Models of communication
  7.2 Types of communication
  7.3 Personal relations
  7.4 Counseling
8.0 Training and Guidance
  8.1 Learning
  8.2 Factors affecting learning
  8.3 Assessment of deficiencies
  8.4 Resolving deficiencies
  8.5 Presentation methods

A more detailed breakdown of each of these content areas is in Course Outline I, Appendix C.

For each of the eight major content areas, or chapters, general objectives had been developed as follows:

Chapter 1. Midshipmen will understand that the knowledge and application of certain psychological principles are directly related to controlling the behavior of subordinates.

Chapter 2. Midshipmen will understand that the basis for a Naval officer's behavior is naval tradition, naval custom, naval regulations, and naval standards of performance.

Chapter 3. Midshipmen will be able to use the concepts of behavior mentioned in General Order 21 to accomplish the Navy's mission (including ramifications of good management, personal examples, and moral responsibility).

Chapter 4. Midshipmen will be able to apply principles of behavior, management, and leadership to the establishment and maintenance of discipline, morale, and esprit de corps.

Chapter 5. Midshipmen will be able to establish and maintain good personal relations with seniors and peers on the basis of prescribed parameters of officer behavior.

Chapter 6. Midshipmen will be able to employ men and materials efficiently using principles of organization, administration, and planning.

Chapter 7. Midshipmen will be able to communicate effectively up and down the chain of command, in counseling with his subordinates, and in interactions with peers (laterally).

Chapter 8. Midshipmen will be able to use principles of training and guidance to erase performance and learning deficiencies among subordinate personnel.

Conflict of Views

After official approval of the Content Outline I, with the rider that certain attached comments be included, Terminal Objectives were prepared and subsequently submitted. A sample is furnished in Appendix D.

With the submission of the Terminal Objectives was included a two-part supplement: one showing the relationship of the Terminal Objectives to the script of General Order 21 and the second showing the relationship of the Terminal Objectives to the 41 Critical Behavior Categories of NAVPERS 9224A.

The Terminal Objectives, which had been derived from the hierarchical structure of the Content Outline, (see Appendix E), was rejected on the basis that most of the Terminal Objectives did not adequately reflect the "critical behaviors" of NAVPERS 9224A and the 31 critical factors of GO21.

The customer then proposed that the critical behaviors from GO21'and the 41 critical factors from NAVPERS 9224A be combined and that the Terminal Objectives be derived from this structure. This requirement brought on the first serious conflict of view between the agencies.

The development contractor stressed that it was in agreement with the customer in using, as the core content of the Leadership Course, material abstracted from the film script of General Order No. 21 and the 41 Critical Behavior Categories contained in NAVPERS 9224A. The difference of opinion was seen as not about the nature of the content; it was more specifically concerned with the development of the content into a well-organized and properly sequenced course of instruction.

The customer had decided the Leadership Course should be constructed as a sequence of 81 "critical factors." Each factor was also categorized into one of eight chapters, which were themselves sequenced as the basic course outline. (See Course Outline II, Appendix C)

Perhaps the most serious difficulty envisioned with this proposed content outline was that it imposed a "flat" structure on the course sequence. Every chapter and critical factor is independent of each other, in the sense that the learning of any particular segment is not based upon the learning of any previous segment. To say it another way, learning of one critical factor would not directly result in mastery of those subordinate competencies which are necessary to the acquisition of learning in subsequent segments.

The contractor contended that a course sequence relying on the 81 "critical factors" ran counter to Briggs (1968, Page 11):

> "...This phrase (a flat structure) is employed to describe the organization or structure of the course when it does not appear to matter in what sequence the instruction for the various major objectives or sub-objectives is arranged. For a course with a flat structure one could either conduct the instruction in a random sequence or in any arbitrarily chosen order which one prefers. The significance of such a structure would be that the competencies gained in reaching each objective are independent from the competencies gained in reaching all other objectives. It is conjectured that if a course is well analyzed for the purpose of deciding upon the sequencing of the instruction, a truly flat structure will seldom be encountered. When one does encounter an apparently flat structure of a course, one can question the value of the course, or perhaps the objectives should be restudied to make sure that they are in fact behavioral objectives rather than content objectives..."

One basic problem in using a flat structure was that if the various parts of the content are related (in a "natural hierarchy"), then a forced flat structure introduces a high degree of redundancy in the instructional sequence. The result was that associations which exist between common elements are never made, and the logical connections which relate general principles to specific events are never formed. The task of learning is thus relegated to a kind of simple rote learning exercise, where only memorization of discrete, unrelated pieces of information is required.

This, WLC contended, results in the absence of general mediators which would otherwise guide the learner through relatively long instructional sequences. These mediators are the bases on which the student assimilates bits of information to form meaningful concepts and principles. Ausubel, 1960 was cited.

The value of these mediators seemed well established in the experimental literature. Tosti (1967), for example, has shown that long-term retention is facilitated by the employment of mediators during acquisition.

As further documentation, the contractor cited a consulting report submitted to the USNA, Briggs and Tallmadge (1967) which described the necessity of studying and analyzing the content and objectives "for the purpose of determining the sequence of instruction. Included in this analysis was a detailed specification of the 'prerequisite competences', referring to the subordinate skills and knowledges which must be acquired in particular sequences in order to attain the mastery of a particular behavioral objective."

These and other references (e.g., Bloom, 1965; Gagne, 1956; Mager, 1961; Gagne and Paradise, 1961) seemed to agree that one stage in the organization of an effective Leadership Course would be to specify those behavioral objectives which were functionally related to each other. A number of references suggested that a hierarchical structure should be expected after the content had been examined. Briggs (1968, p. 107) stated the matter:

> "...It may be said that a number of studies have supported the view that many courses or portions of them, when analyzed carefully, display an inferred hierarchical structure whose validity can be supported by comparing sequences of instruction designed to follow the hierarchy with some other strategy of sequencing. Several experiments provided various kinds of evidence of the validity of the hierarchy, because when learning was sequenced accordingly, learning progressed better than under other sequencing procedures.

Hence, it was the contention that material to date was a well-organized and properly sequenced content development, based on a number of contemporary theoretical and technological models.

It was also emphasized that all 81 critical factors were covered by the content outline; only the development, ordering, and structuring of the content was different.

The attempt to develop Critical Factor 17, designated "A good leader recognizes that his behavior affects those around him," seemed to show the difficulty in the approach as once specified. It was criticized on the following grounds:

1. The critical factor is not definitive enough to allow the writers to specify those events which are related to this critical factor.
2. The critical factor is of such a general nature that several kinds of events could be related under it, as well as under other critical factors.
3. The above condition, i.e., lack of specification of a particular subject content or set of objectives which are appropriate only to this particular factor, makes it difficult to define the segment, leading to the inability to construct test items which in fact truly measure achievement within this segment, independent of all others. This difficulty prevents significant research to be conducted.
4. Since the terminology used in the critical factor is not that used in any reference

> source to identify content, it is virtually impossible to proceed from "terminal" objectives to "enabling" objectives without complete dependence on the Subject Matter Expert (SME) as the main source of information.

Examples of this latter point are as follows: In developing the construct, "A good leader recognizes that behavior affects others," the customer found it necessary to be more specific. He first designated 10 conditions, which specified further factors and subfactors involved in "recognition that his behavior affects those around him." Still, the subfactors, as indicated, are not sufficiently objective to be immediately translatable into behavioral objectives. For example: In attempting to interpret behaviors from the subcritical factor, "master your emotions," one would have to ask the following questions. Are we going to give the subject techniques of mastering one's emotions, or are we going to say that mastering emotions is "good," or are we going to ask him why he should master his emotions? Should he be taught to discriminate between the conditions where he can or cannot master his emotions? What types of emotions should he master? Enthusiasm, joy, pride? Does the term master mean not display? The statement of the subfactor leads us to many further considerations of what specifically is desired by this particular item. However, this is as expected. Normally, the analyst attempts to determine precisely what behavioral objective can be generated by taking such statements from the SME, and by such query, determines the specifics from the total range of those which might be generated.

As a further consideration, Item 3 states, "maintain an optimistic outlook." Obviously, if we asked a student before he even entered this course if a leader should maintain an optimistic outlook or not, he would quite probably predict that he should maintain an optimistic outlook. Therefore, the statement of condition of optimistic outlook is not sufficient. Should the course then teach him how to maintain an optimistic outlook? Should the course in fact devote any time to teaching someone this "behavior", and if so, what? SME further specifies what is meant in "maintaining an optimistic outlook" under a number of subcategories. These include "the will to win being infectuous," "capitalize on your unit's capabilities and successes," maintain an aura of outward calmness," etc. Here, perhaps is a level at which analysts can begin to develop some kind of terminal objectives and perhaps some kind of content specification after much more interaction with the SME.

The second major difficulty, that of "independence" of C.O. for both research purposes and instructional purposes, can be seen in the subfactor which states: "Be at all times physically fit, mentally alert, well groomed, and correctly dressed." Difficulty in "independence" is evident with this item. For example, this exact terminology was used in other Critical Factors. If, in fact, the course did a thorough job of teaching the value of being physically fit, mentally alert, and well groomed, etc., in one segment, the course would be repeating in another unit and therefore expect relatively little change in behavior.

The previously discussed subcritical factor, "master your emotions," also appears as another Critical Factor. If the developers took this as a subfactor within the present Critical Factor, the course would again be teaching something which had already been established.

The development of test items pointed out another problem, i.e., trying to devise content which will allow us to obtain this test performance without specifying some rule for mediation like "always be positive," or establish behavior regarding the "consequences of being negative," etc. If the course just tried to teach this item in an inductive fashion, the student would have responded to anything which was essentially positive. This tendency to "pick the positive" would have come under the specific stimulus control of the problem types employed in instruction, and may reduce the tendency to transfer as much as just presenting the rule with no application. Generally, for good transfer, mediational rules should be used in solving problems. This being true, then stating the rule is as legitimate as a terminal objective as problem solving. Mediation is not only related to transfer, but to retention. Stating what the effect of being negative as opposed to being positive is, i.e., adding "meaningful" associations, would more likely produce a better retention situation.

Resolution of Basic Framework

Most of these points were made during a fruitless four month treadmill wherein test items and objectives were being generated and measured according to the new content outline that relied exclusively on the critical factors. With less than four months remaining for Phase I, a new content outline structure was presented to the contractor by the customer agency. (See Content Outline III, Appendix G.) It basically returned to a reliance on content or subject matter orientation (group dynamics, individual psychology, management principles, etc.) It proved to be eminently more workable since this outline, based on subject matter disciplines, had terminology and concepts which were much more concrete. Thus, it was able to avoid a dependence on vague and multi-meaning terms, such as loyalty, courage, and the like, which was the basis for Content Outline II (the critical factors).

Thus, Content Outline III (Appendix G) became the basic framework for content definition for the remainder of the contract. The process whereby details within each part and segment were refined, was as follows. The content for individual segments of instruction were defined initially by the contractor and reviewed by the customer, who made further specifications. These specifications were then incorporated into the course content outline for approval by the customer agency. Since this development effort for the course content outline was exhaustive, finely detailed, and the product of much reading, consultation, and discussion, it was assumed that upon final approval in Phase I, that content specifications for the course were essentially complete and not subject to revision. However, changes in specifications for the course outline were to be a constant problem over the next two years. Various agents for the customer required changes, modifications, or substitutions for what was considered appropriate and meaningful for the course. In almost every case of respecification of content, the customer basis for requiring the modification was a rethinking on appropriateness and emphasis not based on student performance data.

The implications for the development models should be obvious. It had been the initial decision in this project to start from a content base rather than a terminal objective base. Hence, from the content outline, terminal and enabling objectives were generated and the instructional materials and test item pool fabricated. Each change to the content outline, therefore, had a falling domino effect in that changes were required for every project item which grew out of the content outline. The unwillingness of the various customer agents to give final approval to what was desirable and appropriate as course content outline, was the major conflict of views area for the entire project. Approvals transmitted in Phase I were denied any validity in later phases and were not honored by the customer, who claimed them to be merely provisional.

Because of the experiences of this particular project in defining course content, it is very difficult to generalize on what the optimum procedure should be for that task in the model. In retrospect, it would seem that the procedures initially followed would be adequate, provided that at some given point in time, all parties to the development effort agree that content definition is fixed and subject to change only when student performance data indicates that some false assumptions were made about content and its relation to student capability.

These operational procedures for content definition began with a general blocking out of major subject matter areas after a review of the appropriate literature and existing courses. Individual teams, composed usually of a writer/behavioral analyst and a subject matter expert, drew up drafts which were reviewed by an in-house staff. The product of their discussions were then forwarded to the customer where further discussion ensued after a review. The major discussion area and problem area was generally the requirement to mesh subject matter material with the requirements of a course for the naval service. On this point, discussions were lengthy and generally the hardest to resolve. Once the customer was satisfied that the subject matter areas were covered with an appropriate view to naval service orientation and midshipman requirements, the final draft was prepared and submitted.

At this point in time, it is difficult to imagine any algorithm for obtaining closure on the definition of course content other than the following.

1. A draft prepared by a behavioral analyst and subject matter expert team after extensive reading and discourse among themselves. The former almost as a pre-conscious operation, can provide input to the educational feasibility and probable structure

and final form of the material. The latter, using his expert knowledge of the field, makes professional judgements on the appropriateness of each item to be covered.

2. This draft is reviewed by a higher level in-house staff, whose function it is to insure overall continuity, emphasis, and appropriateness.
3. This draft is submitted for review by the customer agency, if there is one. As a consequence in this review and subsequent discussion, which may be quite lengthy yet extremely important, the following agreements should be reached. The customer adjudges that the content is appropriate and adequate for his purposes, and the contractor feels that he has a workable set of guidelines for generating a viable instructional instrument. Should such an agreement never be reached, or is continually subject to change, the remaining steps of development are exceedingly difficult.

This chapter of the report has attempted to provide guidelines for the first phase of the model - namely, content definition. The other tasks comprising the model - terminal objective definition, course and media design, materials development, etc. - will be treated in successive chapters.

Those differences of opinion cited and changes specified, while honest, were exceedingly costly. Those costs would have been higher if not for the development of depth core (see chapter IV, page 208), which acted as a kind of safety valve, allowing new material to be inserted into the course without fracturing the core structure. When the project began, topics such as race relations and drug abuse in the military did not have the visibility and immediacy that is currently attached to them. These and other items were incorporated through depth core units which had more flexibility than the fifty nine basic core segments. The obvious lesson is that a similar procedure could be employed in any course development effort, or even in an on-going revision of an installed course without necessitating costly change to existing materials.

Perhaps some day a language will be devised that will allow subject matter experts, instructors, and educational materials developers to discuss content and instructional strategies together - that is, the terminology will describe some aspect of content, for example, management, in terms that can be meaningful to the systematic preparation of that material for instructional purposes. Additionally, it would incorporate the means for indicating the presence or absence of value or judgment. Thus, all elements for decision-making on content definition would be explicit and therefore more immediately obvious as points for negotiation.

III. DEFINING OBJECTIVES - STRUCTURING & SEQUENCING RATIONALE

Abstract

This section of the report discusses the theoretical constructs which influenced the preparation of behavioral objectives. It offers samples of the objectives and their sequencing as they actually evolved and the various efforts to insure both a rigorous structure and an instructionally viable sequence.

III. DEFINING OBJECTIVES - STRUCTURING & SEQUENCING RATIONALE

Two general kinds of "sequences" must be constructed in the development of any course of instruction. The first is the Content Sequence, which concerns the organization of the subject matter; the second is the Procedural Sequence, which concerns the organization of the instructional presentation. To be sure, there are interactions at every stage of course development between content and procedure; the content arrangement often determines elements of the instructional methods, and an analysis of teaching methods may suggest a revised ordering of the subject matter. However, because the two sequences are constructed more or less independently - with the content specified and organized before the instructional procedures are designated - it is both possible and desirable to discuss them separately, and to indicate at the appropriate places where their developments intersect.

This section is an analysis of the rationale for sequencing the content of the Leadership Course. Consideration of the content organization was a critical factor in the course development. The "sequencing rationale," derived from contemporary educational and psychological theory, and supported by considerable experimental evidence, served as the logical basis for the content analysis which the researchers and writers developed.

General Theoretical Considerations

First of all, the content of a course may be defined as (1) the set of behaviors and capabilities which the learner is expected to achieve as a result of the instructional experience, and (2) the specific form and type of examples, rules, generalizations and applications through which the student achieves these behaviors and capabilities. As Evans (1968) has pointed out, it is not sufficient to specify content solely in terms of behavioral objectives, because different students may achieve the same objective by different means (i. e., by learning different rules and examples; by exposure to different training stimuli in different patterns, etc.). The content must be defined in terms of both student-performance measures and elements of the task, i. e., what the student will accomplish and by what path he will accomplish it.

The specification of content was thus a very elaborate, detailed process. However, since the learning "steps" are derived from the objectives of the course, one may describe the content sequence solely in terms of the objectives; that is, the content sequence may be defined as the planned arrangement of behavioral objectives in the order of their expected accomplishment.

Briggs (1968) has clearly stated the "educational importance of the sequencing problem:

> ...if all the elements of skill and knowledge a student is to acquire during a given course of instruction are independent one from another (that is, if the learning of one element does not facilitate the learning of another), then the different elements could just as well be taught in any arbitrary or random sequence; but if the elements are dependent one upon another (that is, if the learning of one element transfers, thus facilitating the learning of another), then a careful sequencing of elements in terms of the direction of such transfer should be more effective than a random sequence.

Because the content sequence determined to a large extent how a course was organized, it is reasonable to believe that the sequence contributed substantially to the efforts of the instructional experience in producing the desired behavior changes. Such a suggestion has been supported by a number of recent studies (e.g., Gagne and Paradise, 1961; Gagne, Mayer, Garstens and Paradise; 1962; Newton and Hickey, 1965).

To paraphrase Briggs (1968), the value of planned content sequencing is supported by the experimental finding that learning progresses better under some sequences than under others. There was presently an intense research effort to examine those sequencing variables which significantly affect the efficiency of instructional procedures; it was WLC's intent to utilize what information was presently available, so that the content sequence would facilitate the instruction.

A fundamental concept underlying the development of a valid and useful sequencing rationale was that the acquisition of learned behaviors may require prerequisite capabilities of other, "subordinate" behaviors. This idea, that new learning is built upon prior learning, is a basic element of many recent educational theories. Although the theories often differ in their description of the learning process, in their specific terminology, and in their emphasis on particular aspects of the instructional situation, they each describe human learning as a hierarchical accumulation of acquired behaviors. The word "hierarchy" is used, in the broadest sense, to identify the structural arrangement of a learning experience by specifying the relationships between the prerequisite and terminal behaviors. A brief discussion of three theoretical positions may help to clarify the concept of learning hierarchy as related to content sequence.

Bloom (1954), in describing the organization of his taxonomy of behavioral objectives, wrote:

> Although it is possible to conceive of these major classes (of behavioral objectives) in several different arrangements, the present one appears to us to represent something of the hierarchical order of the different classes of objectives. As we have defined them, the objectives in one class are likely to make use of and be built on the behaviors found in the preceding classes in this list.

Gagne has developed a logic of planned content sequencing based on both task and performance variables. In his book, The Conditions of Learning (1965), Gagne described eight types of learning, "defined in terms of the conditions required to bring them about. These learning types are arranged in order from the most "simple" (stimulus-response learning) to the most complex (application of principles); they are related to each other in that for a given unit of content the acquisition of the simpler types of behaviors is a prerequisite for learning the more complex tasks:

> The most important class of condition that distinguishes one form of learning from another is its initial state in other words, its prerequisites. The conditions for chaining, for example, require that the individuals have previously learned stimulus-response connections available to him, so that they can be chained. If this condition is not met, one finds oneself dealing with conditions for establishing these prerequisite Ss ⟶ R's and thus likely to draw incorrect conclusions about chaining, itself. This generalization, applied to the (eight) varieties of learning...may be briefly stated as follows:
>
> Problem solving (type 8)
> which requires as prerequisites:
>
> Principles (type.7),
> which require as prerequisites:
>
> Concepts (type 6),
> which require as prerequisites:
>
> Multiple discriminations (type 5),
> which require as prerequisites:
>
> Verbal associations (type 4) or
> other chains (type 3); etc.

Gagne related the hierarchy of learning type to the process of learning by attempting to show that "each variety of learning...begins with a different state of the (student) and ends with a different capability for performance."

In other words, "each of the eight varieties of learning conditions...establishes a different kind of capability in the learner," so that learning may be described as the hierarchical achievement of learned capabilities. The acquisition of knowledge would therefore be defined as the achievement of "an inferred capability which makes possible the successful performance of a class of tasks that could not be performed before the learning was undertaken." (Gagne, 1962)

Briggs (1968) has echoed Gagne's conceptualization of the learning process as a hierarchical acquisition of learned capabilities. He used the term "subordinate competencies" to describe those capabilities which must be achieved before a particular task can be mastered.

In a consulting report submitted to the USNA, Briggs and Tallmadge (1967) described the necessity of studying and analyzing the content and objectives "for the purpose of determining the sequence of instruction. Included in this analysis would be a detailed specification of the 'prerequisite competencies', referring to the subordinate skills and knowledges which must be acquired in particular sequences in order to attain the mastery of a particular behavioral objective."

The description of learning as a hierarchical attainment of acquired capabilities has direct application to the planned sequencing of content, since this sequence has already been defined as the ordered arrangement of behavior objectives, and since these objectives are defined as the expected behaviors acquired by the learner as a result of the instructional experience. The task of content sequencing thus involves analyzing the behavioral objectives to determine their dependent and independent relationships, so that the achievement of prerequisite competencies enables the student to attain succeeding behaviors. The rationale for such an analysis has been stated by Gagne (1965):

> The existence of capabilities within the learner that build on each other... provides the possibility of the planning of sequences of instruction. If problem solving is to be done...then the... principles to be applied to the problem must be previously learned; if these principles in turn are to be learned, one must be sure there has been previous acquisition of relevant concepts; and so on. Thus it becomes possible to "work back" from any given objective of learning to determine what the prerequisite learning must be; if necessary, all the way back to simple verbal associations and chains ...When such an analysis is made, the result is a kind of map of what must be learned.

It is this "map of what must be learned" which represented the basic structure of the course. As defined by Briggs (1968), course "structure" is "the description of dependent and independent relationships among component competencies, arranged so as to imply when sequencing can be random or optional and when sequencing must be carefully planned, on the basis that transfer will be optional in order to build up from simple skills to more complex ones."

Briggs (1968) has developed a classification scheme for a number of possible types of structure:

1. A flat structure. This phrase is employed to describe the organization or structure of the course when it does not appear to matter in what sequence the instruction for the various major objectives or subobjectives is arranged. For a course with a flat structure one could either conduct the instruction in a random sequence or in any arbitrarily chosen order which one prefers. The significance of such a structure would be that the competencies gained in reaching each objective are independent from the competencies gained in reaching all other objectives. It is conjectured that if a course is well analyzed for the purpose of deciding upon the sequencing of the instruction, a truly flat structure will seldom be encountered. When one does encounter an apparently flat structure of a course, one can question the value of the course, or perhaps the objectives should be restudied to make sure that they are in fact behavioral objectives rather than content objectives (see Briggs et al., 1967). An example might be a foreign language course involving written vocabulary, but no sentence translation or speaking. Another might be a history course limited to learning dates on which events occurred.

2. A vertical structure. This term is applied when there is one fixed best sequence, in which Objective A should first be taught, the Objective B, and then C, and so on. A course having such a vertical structure thus contains no "lateral transfer" among competencies which would otherwise appear at the same level in a hierarchical structure. It is believed that this type of structure would also be encountered infrequently for a course as a whole, although it may be encountered sometimes in planning the instruction within a single course objective. This type of structure then has only one competence per level.

3. The hierarchical structure. This kind of structuring is represented by a pyramid shaped arrangement of the objective of the course in which the objective at the top of the pyramid is a global, total course objective, and the subordinate objectives are arranged in layers. A hierarchical structure implies that all of the competencies within a layer should be taught before instruction for the next layer is begun (because vertical transfer is expected), although there may be options in the sequencing of the instruction within a layer (if lateral transfer is not expected). A hierarchical structure is a frequently-reported structure for carefully analyzed learning objectives or tasks.

4. Mixed structure. This would be illustrated by a course in which two or more major parts can be taught in random order, but where hierarchies may exist within the parts. This is called "parallel learning" by Ausubel and Youssef (1963). A special case might exist as for foreign language, where vocabulary and sentence structure are both involved. Just how vocabulary and sentence structure are time phased would permit at least these options, desirable or not: (a) teach all the vocabulary, then sentence structure; (b) teach some vocabulary and some sentence structure, using familiar words only in the latter; (c) same as b, but introduce new words in the course of instruction on sentence

structure. There may be instances of the reverse situation, where sequence is important among major objectives but not in the learning of the individual objective.

5. The special case of a flat structure requiring spiral sequencing of instruction. This type of structure is sometimes encountered when the major objective of a course is that the student learn to solve complex problems by analyzing each of several major components in a problem. An example of this has been encountered in discussions with subject-matter experts on learning to analyze foreign policy problems. Subject-matter experts in this area indicate that in making each foreign policy decision in such a way as to appraise each factor individually and also to arrive at the best trade-off decision as relating to each of the 12 factors. In arranging instruction in this case one might proceed first by teaching some individual concepts and principles needed later in analyzing each of the 12 factors to be considered in making a foreign policy decision; this constitutes the first "spiral." These 12 introductory sequences can be taught in any order. Next, a problem would be presented to the student in which the analysis is given to him for 11 factors, and he solves the problem by analyzing the 12th factor and arriving at a decision based on use of the analyses provided for the other 11 (second spiral). In the next problem given, two factors would essentially be left blank, requiring the student to consider the supplied information on 10 factors in terms of his own analysis for the other two factors. By spiraling the instruction the programmer or experimenter continues to supply an increasingly small part of the total solution, while the learner develops the competency to solve an increasingly large part of the problem. After a dozen such cycles or spirals he has acquired the capability to analyze a new problem by analyzing all 12 of its components, and making the decision for action. While there might conceivably be a better way to

> to approach such instruction, the spiral sequencing at least represents one logical approach for this type of problem. This type of learning structure has been discussed by Glaser (1962) and by Bruner (1963), who refers to this sequencing procedure as "revisiting," or learning which "turns back on itself." In the "RULEG" system of programing discussed by Glaser, a wider variety of examples or finer discriminations may be accomplished by the latter spirals.

Although Briggs has outlined a number of possible structural arrangements of behavioral objectives, both he and Gagne have hypothesized that the analysis of most courses of instruction would reveal a hierarchical structure, "represented by a pyramid-shaped arrangement of the objectives...in which the objective at the top of the course is a global, total objective, and the subordinate objectives are arranged in layers. (Briggs, 1968) Gagne (1965) has suggested that "the subjects of school instruction possess hierarchical organizations with respect to required types of learning. Each can be analyzed to reveal prerequisite learnings that grow progressively simpler as one works downward from principles to Ss ⟶ R connections.

And Briggs (1968) has cited a number of studies which have:

> ...supported the view that many courses or portions of them, when analyzed carefully, display an inferred hiearchical structure whose validity can be supported by comparing sequences of instruction designed to follow the hierarchy with some other strategy of

> sequencing. Several experiments provided various kinds of evidence of the validity of the hierarchy, because when learning was sequenced accordingly, learning progressed better than under other sequencing procedures.

"In a general sense," Briggs (1968) wrote, "an analysis of the behavioral objectives for any course of instruction should be the starting point. A study of the extent of apparent interdependence or independence among such objectives should suggest the latitude one might have in blocking out the molar units of instruction as to their place in the course, and an effort to determine the internal structure of each objective in terms of structures which appear to be vertical, flat, or hierarchical in nature should provide a starting point for considering the more molecular structure of the course."

Briggs' suggestion, that the more general and comprehensive objectives should first be identified and sequenced, has been extended by Stolurow and Brennan (1968). According to these authors, statements of behavioral objectives can be made at two basic levels. The first level is the macro-level of objective, which roughly corresponds to behaviors brought about in students as the result of studying relatively large areas of the content. The second level is the micro-level of objective, which corresponds to behaviors brought about in students as a result of studying relatively specific elements of the content.

Macro Objectives

Stolurow and Brennan (1968) define macro-objective as the overall, large-scale instructional intention of the objective or test item. Macro-content refers to the general section of the course to which the objective or test item is aimed. In this case, macro-content refers to the clustering of content into meaningful course Chapters (or Parts). For example, a Part concerned with communication should have as the basic objective the development of skills in communication as evidenced by the ability to appropriately apply principles of communication in new problemsolving situations. Macro-objectives will be stated as expected changes in student behavior which occur as the result of interaction with Parts or macro-content. They will not necessarily include the specific activity the student must perform to demonstrate his mastery of the objective.

Micro-objectives, on the other hand, will be stated as terminal behaviors the student will engage in, and will immediately imply his degree of mastery of the objective. These objectives will contain a verb ("virile verb") which specifies the exact performance expected of the student in relation to the specific content measured.

Stolurow and Brennan (1968) define micro-objective as a statement of something the learner will "do". The rationale for stating the objective in this way is that the learner's behavior can be observed and measured, i.e., tested (Mager, 1962; Loree, 1965; Gagne, 1965). Micro-content is defined as the very specific area of knowledge with which the test item or objective is concerned. It is the specific object of the "do" statement. Stolurow and Brennan note a major distinction between micro- and macro-content in that micro-content is always found in a typical statement of an educational objective whereas macro-content is often merely implied. The value of stating the behavioral objectives at both levels is that the macro-objective may be used to describe the general course structure, and the micro-objectives may be sequenced independently within macro-content units.

As already stated, the specification of behavioral objectives was a preliminary task in the development of the content sequence (primarily because the sequence may be defined as an ordered arrangement of the objectives).

WLC's next undertaking, therefore, was to categorize the specified material into individual topic units, each defined (in behavioral terms) as a macro-objective. It should be mentioned that there were a number of advantages in identifying these macro-objectives, besides those discussed earlier in this paper:

a. It was possible to identify the intent of the course in a few, rather than many, general statements.

b. The macro-objectives lend direction to the sequencing of major aspects of course content and to the sequencing of instructional procedures.

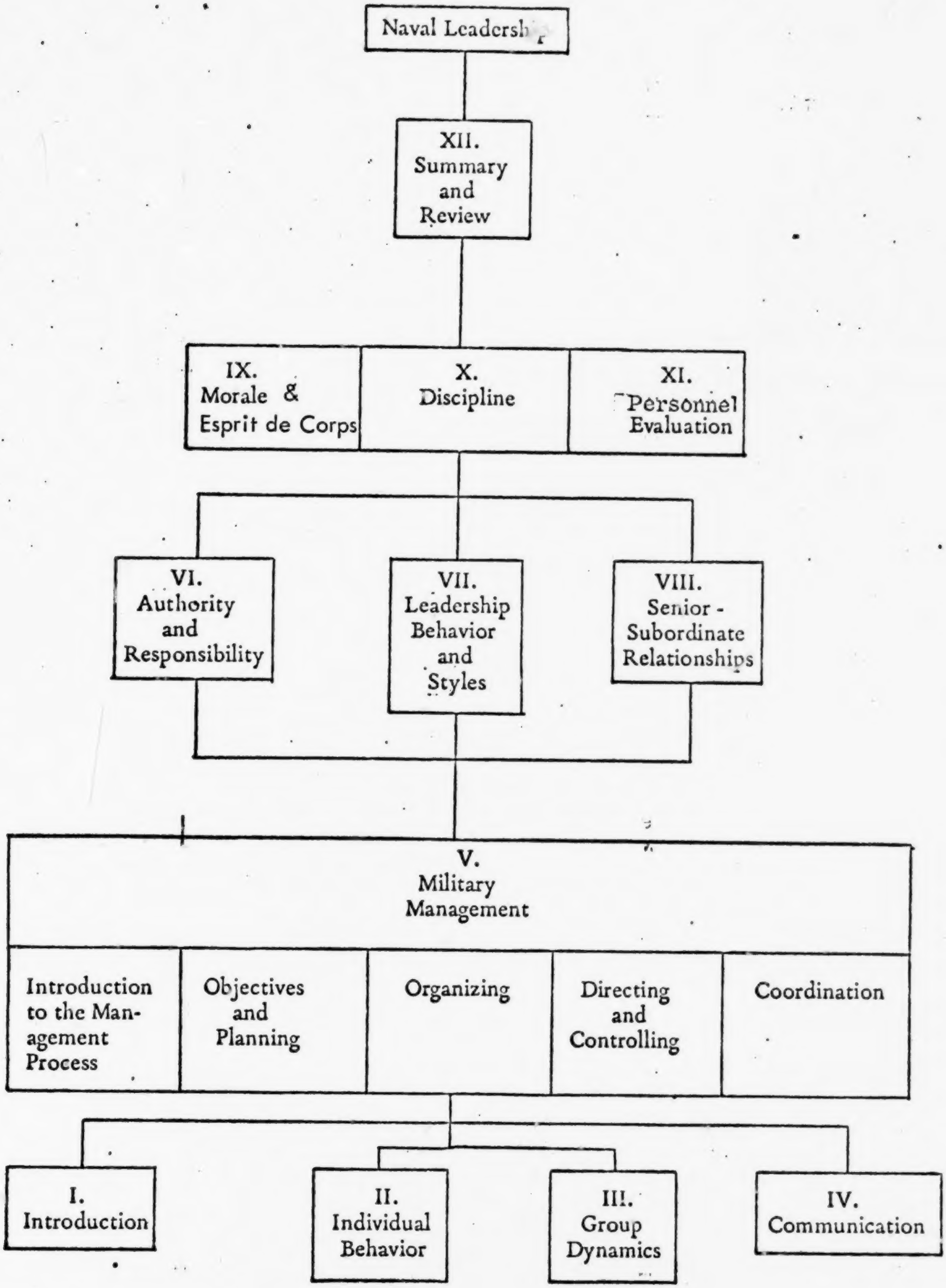
c. The macro-objectives can themselves be defined by a set of micro-objectives. This facilitates the efficient classification of content material within topic units, and also aids in planning the sequence of the units.

d. The macro-objectives can be tested to determine the effectiveness of the instructional system.

e. Tests, based on macro-objectives, will also give some indication of long-term retention of the principles of leadership.

After analyzing the content provided, WLC, in conjunction with the Naval Academy, categorized the content into twelve topic units (or domains) called Parts (or Chapters). Each of these twelve Parts was represented by a macro-objective.

These macro-objectives were then sequenced in the manner suggested by the theories which have already been reviewed. The basic inferred course structure, as generated by the sequencing of macro-objectives, was found to be a hierarchical arrangement of the Parts. The diagram on the next page illustrates this hierarchical structure.


Naval Leadership
XII. Summary and Review
IX. Morale & Esprit de Corps
X. Discipline
XI. Personnel Evaluation
VI. Authority and Responsibility
VII. Leadership Behavior and Styles
VIII. Senior - Subordinate Relationships
V. Military Management
Introduction to the Management Process
Objectives and Planning
Organizing
Directing and Controlling
Coordination
I. Introduction
II. Individual Behavior
III. Group Dynamics
IV. Communication

Hierarchical structure of the topic units (Parts) of the Naval Leadership Course

It can be seen that the course was organized into four (horizontal) levels, each level containing one or more topic units. The achievement of the macro-objectives at each of the levels was prerequisite to the acquisition of knowledge in the next higher level. Mastery of the principles of military management, for example, was facilitated by the knowledge of the principles of individual behavior, group dynamics, and communication.

The micro-objectives (or "terminal objectives") identify the specific learned behaviors which the student was expected to accomplish as a result of the instruction. The micro-objective closely fits Mager's (1962) definition of a behavioral objective as an "intent communicated by a statement describing a proposed change in a learner -- a statement of what the learner is to be like when he has successfully completed a learning experience."

It is important to recognize the critical relationships between macro- and micro-objectives. A macro-objective, although by itself a rather general description of achievement, is exactly defined by the set of micro-objectives comprising the topic unit. The macro-objective may then be considered as a "summary statement" of a number of content-related micro-objectives. An example of each type of objective, in its relation to each other and to content, might be:

MACRO-CONTENT (PART): Communication

MACRO-OBJECTIVE: the student will be able to demonstrate the ability to communicate effectively.

MICRO-CONTENT (SEGMENT): Second principle of communication.

MICRO-OBJECTIVE (TERMINAL OBJECTIVE): Given a list of hypothetical situations, the student will demonstrate his understanding of the second rule of communication by selecting the appropriate situation in which it would apply.

Micro Objectives

The micro-content and terminal objectives were derived from the content. Since this content was largely a description of the principles (rules) of leadership, the terminal objectives are statements of the students' expected in-depth acquisition of these principles; the objectives are emphasizing three major types of capabilities:

a. The student will demonstrate his knowledge of the rule by being able to discriminate a statement of the rule from a number of alternatives.

b. The student will demonstrate his understanding of the rule by being able to generalize the rule in a given situation.

c. The student will demonstrate his ability to apply the rule by using it in problem solving situations.

Some advantages of specifying the terminal objectives in this way, in addition to those already mentioned, was:

a. The micro-objectives required the student to "do" something which can be observed and measured.

b. The micro-objectives gave direction to the sequencing of the segment content and sequencing of presentation variations within segment instruction.

c. The micro-objectives were tested by a number of test items which involve discrimination and generalization as well as problem-solving abilities.

d. Tests of the micro-objectives provided valid and reliable estimates of the effectiveness of segment presentation.

e. Tests of the micro-objectives made it possible to pin-point the student's specific areas of difficulty in learning materials.

An individual terminal objective (T.O.) only partially defines a macro-objective, and therefore, is by comparison a relatively small unit of behavior. However, by itself a T.O. represents a sizable achievement, requiring a number of prerequisite competencies for its accomplishment. Since these prerequisite competencies "enabled" the student to achieve the final terminal behavior, they are called, appropriately, enabling objectives (E.O.).

The analysis of each terminal objective - which entails the specification and sequencing of its enabling objectives - was one of the most difficult, most elaborate, and most important tasks in the organization of the Leadership Course. It was in this task that the theory which we have been discussing finds its most effective application, because the sequence of the instructional procedures was derived in large measure from the sequence of enabling objectives.

Suggestions from six different theories contributed to the rationale for the specification and sequencing of enabling objectives:

1. Gagne (1965) has stated that complex, learned behaviors are built up from more simple behaviors. Since most of the terminal objectives are at the Type 7 (Principles)

and Type 8 (Problem Solving) levels, one facet of the task is to specify the enabling behaviors in terms of Gagne's learning types. The analyses completed thus far have indicated that the enabling objectives were arranged in a hierarchy within each terminal objective.

2. Bloom's (1965) taxonomy has also been used in the analysis of the terminal objectives. Bloom's major categories of educational objectives (knowledge, intellectual abilities, and skills) have served as the basis upon which the T.O.'s are measured; the student will demonstrate his mastery of each T.O. by being able to discriminate the rule, generalize from the rule, and solve problems by applying the rule. Each of these requirements indicated the content and form of many of the enabling objectives.
3. Briggs' (1968) discussions of course structure based on hierarchies of competence have also contributed to the construction of the E.O. sequences.
4. The RULEG system, proposed by Evans, Homme, and Glaser (1962), contributed procedures for analyzing the T.O.'s and E.O.'s in terms of their rules and examples. This method also

considered the hierarchical nature of learning based on the type of discrimination and generalization required.

5. Gilbert's (1962) competition-facilitation analysis was used extensively in the designation of the enabling objectives. This procedure dealt with other elements of transfer besides hierarchical facilitation. It was essentially an analysis of behavior domains in which discrete components of subject matter are identified and grouped. Gilbert's methods suggested which behaviors should be taught together, which should be taught separately, and the general ordering of the instruction.
6. Tosti and Ball's (1969) media selection model considered the importance of planning the sequence of instruction. These authors included sequence within the "distribution" dimension of presentation. This dimension referred to "the ordering, grouping, and sequencing of behavioral items and the temporal spacing between such items. Distribution included such items as the distribution of practice, the frequency of review and the hierarchy of content presentation." Describing the concept of behavioral hierarchies, Tosti and Ball (1969) write:

III-6

> It is known that behavior which can be built onto already existing behaviors is generally facilitated in its acquisition, retention, and generalization. This is one of the primary differences between the application of modern behavioral theory and the application of behavioral theory in the twenties. Thus, if a new stimulus-response (S-R) pair is going to be installed, it would be most advantageous to have certain other S-R pairs previously established. Of course, such antecedent behaviors may have been established before the instructional setting, or the distribution decision to create and establish such behaviors within this instructional setting might be made before the establishment of the new behavior. There are several classes of such behaviors which must be considered. These include stimulus discrimination, response differentiation, existence of mediators such as understanding, analogy, or mnemonic, and those response sets concerned with observing and covert responding sequence.

The specification and sequencing of the terminal and enabling objectives presently completed was based on the theoretical positions we have just described.

Some Problems and Their Resolutions

At a more detailed level of specificity, the following examples and charts may illuminate the problem of defining objectives in a soft science such as leadership, psychology, and management, structuring and sequencing them.

The first and most obvious problem is the potential conflict that comes in an hierarchical arrangement of content topics and the hierarchical analysis of objectives. The two are not necessarily coincident or congruent. Still another problem, but not discussed here, is the necessity of congruence between content topics and objectives on the one hand and the actual instructional material as it is developed by the writer. For example, a content topic might be listed first in the outline because of its importance to the subject matter expert and the objective derived from that content is likewise placed at the initial step. The writer, on the other hand, employing an inductive approach to the materials, may relegate that content and objective to some other area of the instructional program.

The problem of fit between content topics and objectives can be a persistent one. In this project, however, the objectives were derived from the content topics. While some may argue that task analysis of requisite behavior and the subsequent sequencing of the result is the most desirable way to generate objectives, content specification was given priority by the customer, who specified that terminal and enabling objectives would be derived from major and minor content headings. The question raised at this point, is whether or not the assumptions used in the ordering of content topics was done with sufficient wisdom such that an hierarchical structure of objectives would be successful. The following series of extracts pertaining to Part 7 indicates that the hierarchical analysis of topics as initially defined by both subject matter experts and writers, has a remarkable congruence to an analysis of the objectives as they are actually sequenced. In addition, they both reflect a viable sequence from simple to complex learning.

Table 3, an extract from the content outline from Part 7, Segment 5, specifies in some detail both the topics to be covered in participative leadership, as well as the relationship of the topics. While not a true hierarchical arrangement, the extract indicates the relative subordinance or dominance of all topics.

Table 3

Content Outline
Part 7 Segment 5

(Extract)

TABLE 3

PARTICIPATIVE LEADERSHIP

A. Introduction (Petrullo and Bass; Filley and House)

1. Research

   a. Results show that a democratic (participatory) atmosphere produces better morale than an autocratic atmosphere; that is,

      Less hostility

      More cooperation

      Greater friendliness

   b. Experimenters have found that leaders who use participative leadership are significantly more effective than those who use a highly formal structure. (Anderson and Fiedler):

      Made a greater contribution to group's performance.

      Personality became more salient and more highly relevant to group achievement (Hollander and Julian, 1969).

2. Importance

   a. Improvement in group (follower) performance through participative leadership:

      Leader should participate rather than merely supervise.

      Leader will encounter less resistance and get higher productivity from group and individuals who formerly resisted change when they are allowed to participate in decisionmaking concerning their work (Hays and Thomas, p. 40).

   b. An effective leader encourages subordinates to offer suggestions and/or constructive criticism.

3. Practical Implications

   Generalizations from research studies conducted under strictly controlled laboratory conditions in industrially

TABLE 3 cont.

oriented settings were not typical of practical shipboard situations and should be avoided.

The situation is an important determiner in leadership style.

B. Participatory vs. Supervisory

1. General

A leader who uses participative leadership:

a. Must be attentive to his followers' suggestions and reactions (not just lip service).

b. Retains his authority and responsibility under both participatory and supervisory leadership.

c. Must understand that the degree of participative leadership depends upon the leader, followers and the situation.

1) Leader:

Confidence in his petty officers

Concern for his petty officer's opportunity and motivation to demonstrate performance in decision-making

2) Followers:

Attitudes with respect to assuming responsibilities

Experience

Competence

An effective leader seeks responsibility and develops a sense of responsibility among his subordinates.

3) Situation:

Time available to make decisions

Type of organization

2. Advantages

An officer who practices participative leadership:

Will probably increase morale within his organization,

TABLE 3 cont.

Helps to inspire enthusiasm among his men,

Helps develop leadership skills on the part of his subordinates,

Strengthens his communications channels with his followers through improved feedback,

Through the use of committees, when time permits, will find that the skills and knowledge of his men are probably greater than he imagined,

Will find the men likely to respond with extra effort in emergency situations.

a. An effective leader, upon reassignment, can answer affirmatively: "Are the men I have just left, better men for my having served with them?"

3. Barriers to Participative Style

   a. Lack of time

   b. Decisions contrary to interest of followers

   c. Followers unwilling or not motivated to follow

   d. Leader's fear of failing because he might lose control of the group and the situation or, because of past failures.

C. Summary

1. Democratic, participatory leadership:

   a. Produces better morale, less hostility, more cooperation and greater friendliness.

   b. Produces leaders who are significantly more effective and make a greater contribution to group performance.

   c. Must be tempered by the situation. The situation is an important determiner in leadership style.

A quick reading of Table 3, in conjunction with the extract of course objectives [Table 4], indicates, both an ordering of the terminal and enabling objectives as well as their relationship to the content outline for that segment. It is noted that each terminal objective has a relationship to major content headings in the outline.

An independent analysis of terminal objectives to determine ascending difficulty of cognitive requirements or skills is shown in Table 5. The cognitive behavior requirements, listed on the right side of the table, indicate a successive degree of abstract thought as the student would move through the various tasks specified by the terminal objectives.

Content maps are discussed in more detail elsewhere, but the content map supplied in Figure 7 was a further attempt to analyze this segment to determine: first, if a hierarchical arrangement and a logical ordering did exist in content definition, and secondly, if the objectives reflected a congruent hierarchy.

Table 4
Objectives
Part 7 Segment 5
(Extract)

TABLE 4

Outline Reference	Terminal and Enabling Objectives	
A.1.	The M will be able to identify, from several choices, statements that correctly describe the general results of studies done on participative leadership.	TO 1
A.2.	The M will be able to select, from several choices, the statement which correctly identifies the effect participative leadership may have on a group's resistance to change.	EO-1
A.3.	The M will be able to identify, from several choices, the dangers involved in making generalizations from laboratory studies to shipboard life.	EO-2
B.	Given examples of leaders interacting with groups and using various leadership styles, the M will be able to identify the situation in which the leader uses participative leadership.	TO 2
B.1.a.	The M will be able to select, from several choices, the statement which correctly indicates how the leader must treat the suggestions of a subordinate in order to ensure successful participation.	EO-1
B.1.b.	Given a description of a situation in which the leader is using participative leadership with his group, the M will be able to identify whether or not the leader's authority is weakened.	EO-2
B.1.b.	Given descriptions of leaders utilizing participative leadership, the M will be able to identify whether or not the leader is relieving himself of his responsibility.	EO-3

TABLE 4 cont.

Outline Reference	Terminal and Enabling Objectives	
B.	Given a description of a group, the M will be able to select, from several choices, the action which the leader should take regarding participation.	TO 3
B.1.c.	Given several descriptions of the job competence of a group in relation to the job competence of the leader, the M will be able to select those descriptions which indicate that the leader should use participation.	EO-1
B.2.	The M will be able to identify, from several choices, statements that correctly describe the effects of participative leadership when used by military leaders.	TO 4
B.2.	Given a list of possible advantages accruing from the use of participation (both valid and nonvalid), the M will be able to select those which are valid.	EO-1
B.3.	Given a description of a situation in which a leader has the option of permitting participation of subordinates or not, the M will be able to select, from several choices, the correct action for the leader to take (based on evaluation of the barriers inherent in the situation).	TO 5
B.3.a.	Given several descriptions of situations in which participation might be used, the M will be able to identify those in which participation could not be used because of a time factor.	EO-1

TABLE 4 cont.

Outline Reference	Terminal and Enabling Objectives	
B.3.b.	The M will be able to select, from several choices, the statement which correctly describes a barrier to participation resulting from a subordinate.	TO 5 EO-2
B.3.d.	The M will be able to select, from several choices, the statement which correctly indicates how fear of failure on the part of the leader might prohibit the use of participation.	EO-3

Table 5

Analysis of Terminal Objectives Ascending Difficulty of Cognitive Skills

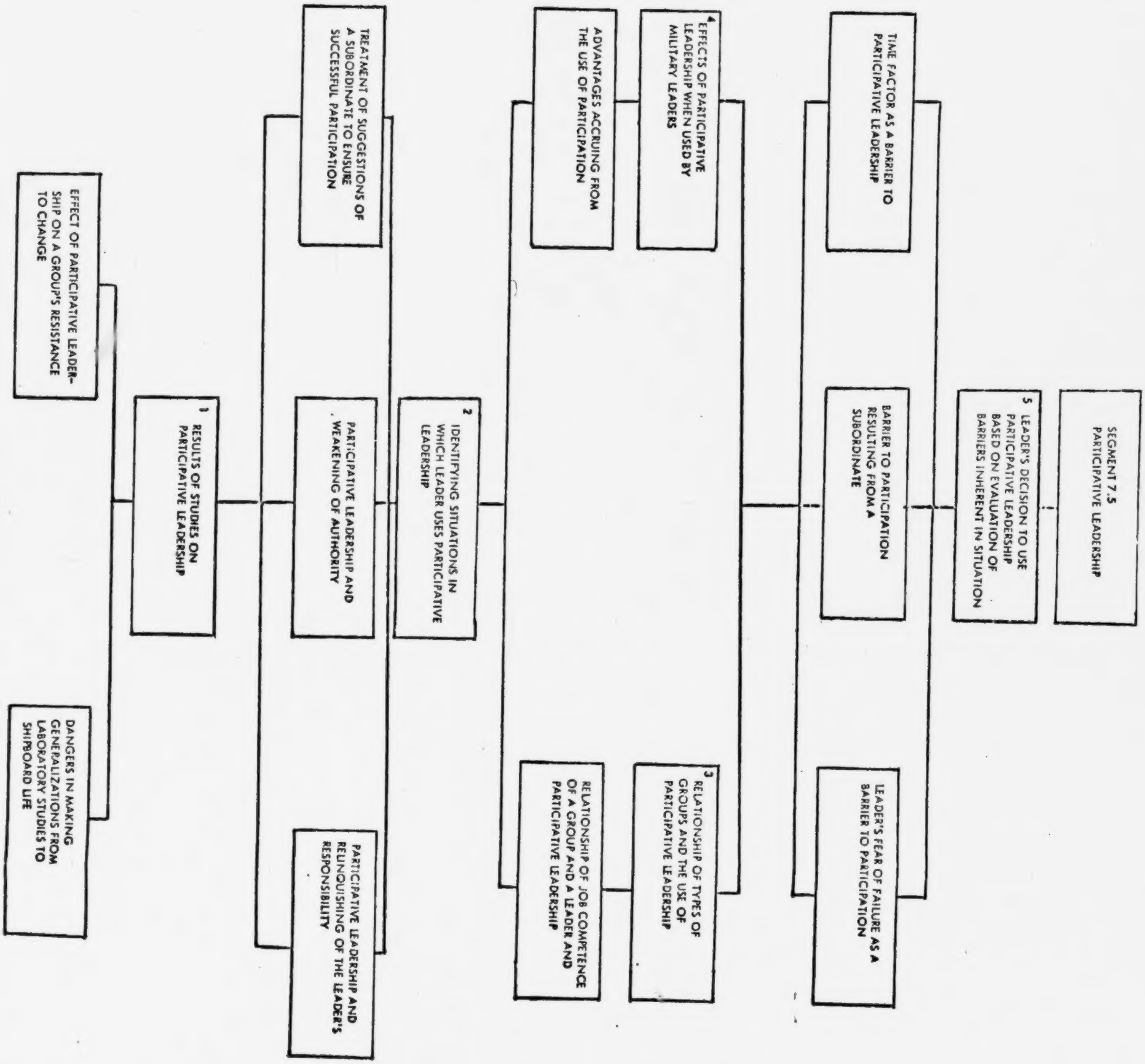
TABLE 5

PART SEVEN, SEGMENT 5 -- PARTICIPATIVE LEADERSHIP

	Terminal Objectives	Cognitive Behavior Requirements
TO-5.	Given a description of a situation in which a leader has the option of permitting participation of subordinates or not, the M will be able to select, from several choices, the correct action for the leader to take (based on evaluation of the barriers inherent in the situation).	Differentiation of multiple causes/ multiple effects
TO-4.	The M will be able to identify, from several choices, statements that correctly describe the effects of participative leadership when used by military leaders.	Projective cause-effect understanding
TO-3.	Given a description of a group, the M will be able to select, from several choices, the action which the leader should take regarding participation.	Prescriptive selection from a group - applying principles of subject matter
TO-2.	Given examples of leaders interacting with groups and using various leadership styles, the M will be able to identify the situation in which the leader uses participative leadership.	Simple discriminations to isolate concrete applications of the definitions
TO-1.	The M will be able to identify, from several choices, statements that correctly describe the general results of studies done on participative leadership.	Understanding broad generalizations

FIGURE 7

Content Map - Segment 7.5


CONTENT MAP BY OBJECTIVES
SEGMENT 7.5 PARTICIPATIVE LEADERSHIP
5 LEADER'S DECISION TO USE PARTICIPATIVE LEADERSHIP BASED ON EVALUATION OF BARRIERS INHERENT IN SITUATION
TIME FACTOR AS A BARRIER TO PARTICIPATIVE LEADERSHIP
BARRIER TO PARTICIPATION RESULTING FROM A SUBORDINATE
LEADER'S FEAR OF FAILURE AS A BARRIER TO PARTICIPATION
4 EFFECTS OF PARTICIPATIVE LEADERSHIP WHEN USED BY MILITARY LEADERS
ADVANTAGES ACCRUING FROM THE USE OF PARTICIPATION
3 RELATIONSHIP OF TYPES OF GROUPS AND THE USE OF PARTICIPATIVE LEADERSHIP
RELATIONSHIP OF JOB COMPETENCE OF A GROUP AND A LEADER AND PARTICIPATIVE LEADERSHIP
2 IDENTIFYING SITUATIONS IN WHICH LEADER USES PARTICIPATIVE LEADERSHIP
TREATMENT OF SUGGESTIONS OF A SUBORDINATE TO ENSURE SUCCESSFUL PARTICIPATION
PARTICIPATIVE LEADERSHIP AND WEAKENING OF AUTHORITY
PARTICIPATIVE LEADERSHIP AND RELINQUISHING OF THE LEADER'S RESPONSIBILITY
1 RESULTS OF STUDIES ON PARTICIPATIVE LEADERSHIP
EFFECT OF PARTICIPATIVE LEADERSHIP ON A GROUP'S RESISTANCE TO CHANGE
DANGERS IN MAKING GENERALIZATIONS FROM LABORATORY STUDIES TO SHIPBOARD LIFE

There is some difficulty in specifying the relationship between course objectives and the classifications as established by Bloom and others. A detailed exposition of all considerations is detailed in TR 6.12. For purposes of this report, one can summarize two conditions. It was specified early in the project that all terminal objectives and subsequent test items related to them would be problem solving, that is: the midshipman would be given a situation or a description typifying a true-to-life situation. He would then be required to select the best course of action from his knowledge of previously delineated principles. To the degree that this was possible, terminal objectives and the test items that proceeded from them were thus constructed. Problem solving, however, is a higher order abstraction as defined by most taxonomies and the effort to make "problem solving" oriented conditions for all terminal objectives was not always successful. However, it can be summarized here that according to the letter, if not always the intent, 90% of the terminal objectives are at the Type 7 [Principle] and Type 8 [Problem Solving] levels of Gagne's learning types. Almost all (97%) enabling objectives had equivalence to Bloom's categories one through four or other lower order learning classifications. In addition, they are sequenced in levels of competency within each cluster.

Previous discussion centered on the relative importance of several theoretical constructs used as actual guidelines, preparing, structuring, and sequencing the objectives. The question naturally arises as to the exact relationship between those theoretical constructs and the end product, also the resolution of conditions where conflicting theories suggested alternative paths. These problems were somewhat obviated by the specification from the customer that all objectives were to follow topic headings. Secondly, most theoretical models tie the problem of content specification to the writing of objectives. Since the definition of content came before the definition of objectives, and since the customer specified that objectives would follow content, much of the theoretical consideration for content structuring via objectives was moot.

The practical application of the theoretical constructs had its greatest impact in articulating the objectives in such a manner as to provide rigorous guidelines for the writers of instructional materials and the test items. In conjunction with this, was the problem of translating substantive content as determined by topic headings into instructionally viable sequences. Also, given the constraints of the existing content structure, there was the concurrent problem of retrofitting all components of a well-defined objective around previously specified content. Where the structure naturally lent itself to a smooth ordering of competencies, the writing of objectives presented no difficulty. Unfortunately, this was not always possible and some objectives had either a forced fit, or were delinquent in satisfying the requirement of a well-constructed series of objectives.

On the whole, the potentially deleterious effects from these conditions did not materialize in the course of materials development. For while some objectives initially had some structuring and sequencing problems, the continuous revision process over the course of the project remedied any deficiency. The conclusion here, as with other elements of the developmental process, is that empirical data will provide all necessary guidelines for revision of course components.

Thus the technical problems of constructing objectives can be separated from theoretical considerations for sequencing. That is, given content statements, the writer of objectives can specify precise details for the action, conditions, criteria, etc. The rationale for micro-sequencing of objectives presents other problems. The macro-sequencing by part, segment, and major topics has been treated previously. Micro-sequencing attends to the ordering of enabling objectives under terminal objectives, and in some cases in ordering of two or more terminal objective clusters. Here theoretical schools offer no single solution. Hence, an eclectic rationale evolved. Most hierarchies of learning levels are scalar in nature and peg certain competencies at one level only. It would seem in reality, that the learner proceeds through a series of steps that might be analogous to nested DO loops in a fortran program. The learner, even at rudimentary levels, does some analysis, synthesis, and evaluation as he deals with gross knowledge. Each terminal and enabling objective cluster, as ultimately defined through many revisions of the course, suggest that learning competencies proceed in a cyclical fashion through all levels of learning hierarchies. Bloom's six classes of knowledge, comprehension, application, analysis, synthesis, and evaluation are repeated again and again in all or in part, but in actual fact, some elements of analysis and synthesis are ordered before application.

In sum, theories were not used to establish content, and when bounced against the realities of an entire course structure, they fused into a workable mechanism for for micro-sequencing terminal and enabling objective clusters. The conclusion suggested is that scalar ordering of competencies in a locked step pattern is untenable for course construction. Competencies, as well as content, can have a cyclical pattern in an unending sequence of learning experiences.

An illustration of this process is seen by examining the terminal and enabling objective clusters in Table . Terminal objective 1 asks that the student select a description of a higher order interrelationship between elements. It is supported by two enabling objectives - EO 1, on a simpler level, asks for a selection of an appropriate definition; EO 2 basically asks for a demonstration of understanding of one element. Thus, the student moves from simple definition to simple relationship of parts terminating in an understanding of larger relationships. Terminal objective 2 has its own cluster. Ultimately, he should be able to choose the best description of an abstract concept. The enabling objectives,leading the student to that conclusion, successively require proper identification of examples of individual components of the total concept and some lower level analysis.

It should likewise be noted that there is a progression from Terminal Objective 1 to Terminal Objective 2. The former establishes the overall framework necessary for understanding of a specific variation within that framework. Neat classification by any one taxonomy, therefore, is difficult. The overriding conclusion suggests a cyclical hierarchy of learning competencies.

TABLE 6

Outline Reference	Terminal and Enabling Objectives	
A.	Given several statements about leadership behavior and leadership style, the M will be able to select the statement which correctly describes the interrelationship between them and the situation (based on the concept of leadership style).	TO 1
A.1.a.b.	The M will be able to select, from several choices, the statement which correctly defines leadership style in relation to a leader's responsibilities.	EO-1
A.1.c.	The M will be able to select, from several choices, the statement which correctly describes the relationship of the need structure of the leader to his changing behavior.	EO-2
B.1.	Given a description of an officer leading a group, the M will be able to select from several choices, the correct classification of the leader's style according to Fiedler's concept.	TO 2
B.1.a.	Given several descriptions of an officer leading a group, the M will be able to select the example which illustrates relationship-oriented style.	EO-1
B.1.b.	Given several descriptions of an officer leading a group, the M will be able to select the example which represents task-oriented style.	EO-2
B.1.c.	The M will be able to identify, from several choices, the paragraph which correctly compares relationship-oriented and task-oriented styles.	EO-3

Content Maps

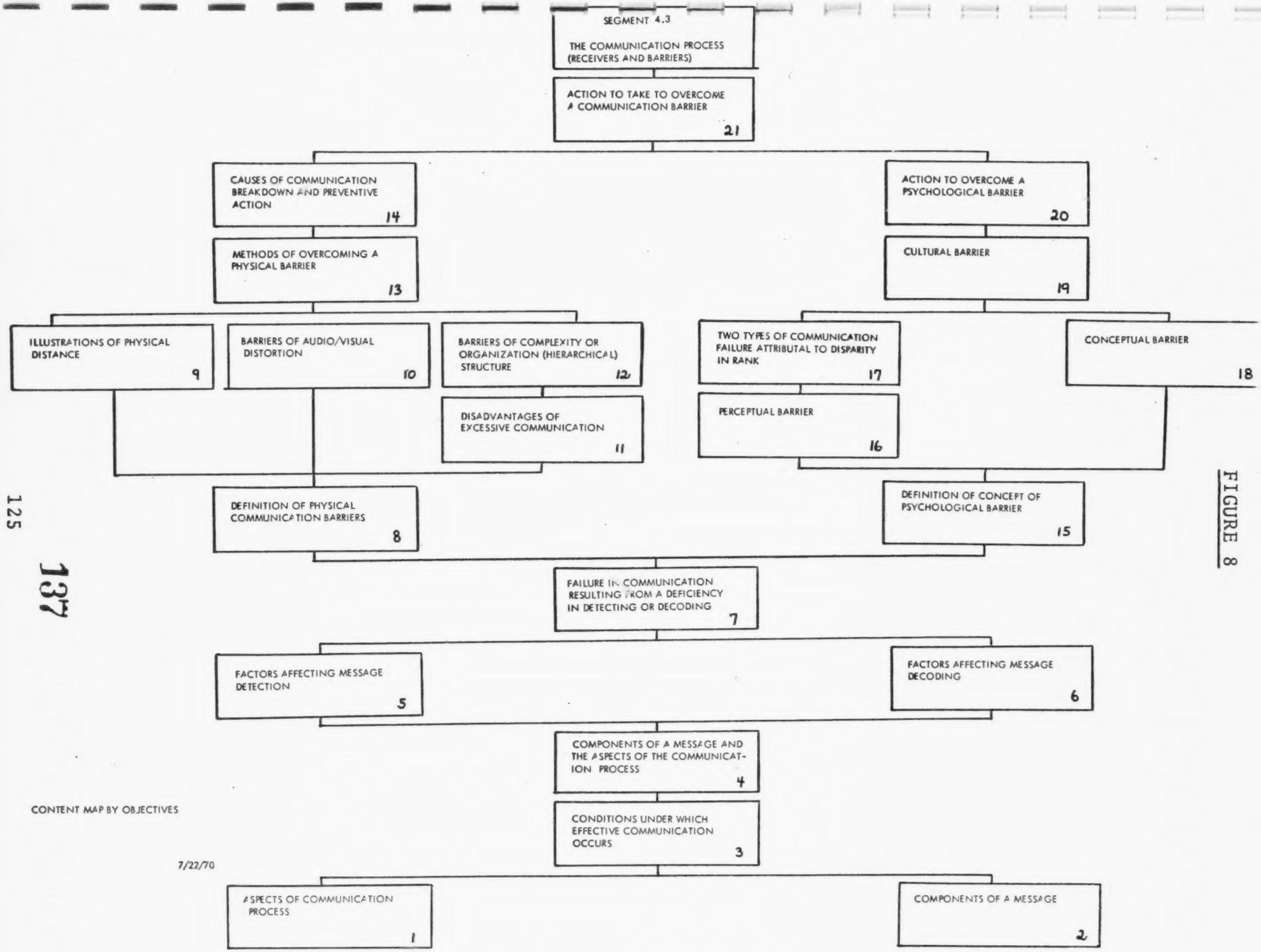
One of the tools for analysis of the objectives for this project were content maps - a structured, graphic arrangement of the objectives by the content contained within each. While mentioned elsewhere, they're discussed here with the further purpose of examining not only the validity of the hierarchical structure, but to assess their fundamental usefulness as developmental tools. They were developed in this form (Figure 8) after the fact; that is, they were not used as development tools,but for post hoc analysis. During the development stages, hierarchies were contructed informally by the analyst prior to structuring and sequencing, but no formal record at this level of detail was prepared.

During the project, the content maps gain some additional consideration since they were incorporated into the instructional material as pre-organizing devices for the students. The evaluation of their effectiveness showed no statistically significant benefit, although it was generally agreed that such one page segment charts might be useful for both preview and review. Additionally, some controversy arose over the conventions used by the maps in structuring the content of the segment. Out of this disagreement, the maps as typically structured in

FIGURE 8
Content Map
(Segment 4.3)

A Graphic Representation of Topic Relationships Within a Segment.

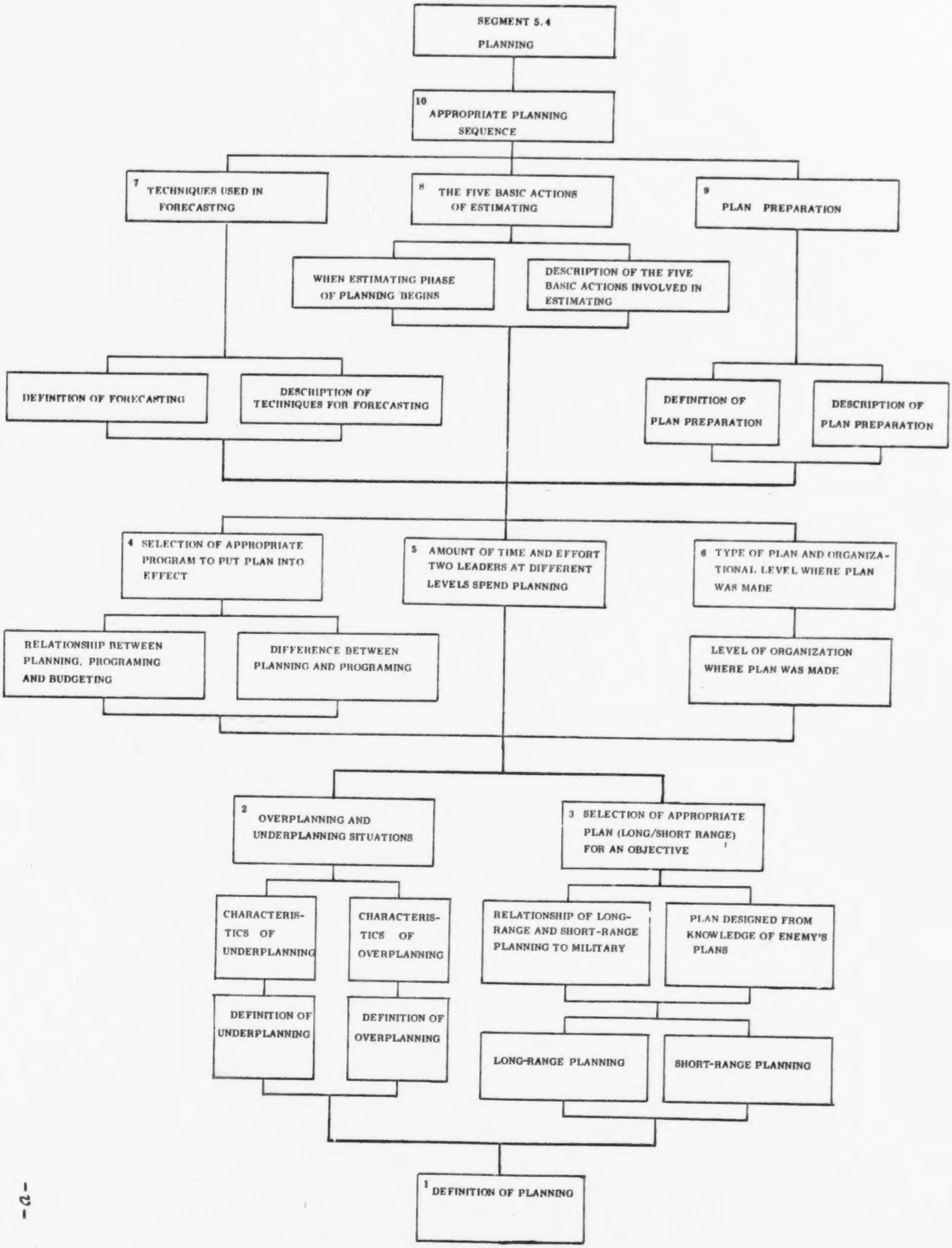
FIGURE 8


SEGMENT 4.3
THE COMMUNICATION PROCESS (RECEIVERS AND BARRIERS)
ACTION TO TAKE TO OVERCOME A COMMUNICATION BARRIER 21
CAUSES OF COMMUNICATION BREAKDOWN AND PREVENTIVE ACTION 14
METHODS OF OVERCOMING A PHYSICAL BARRIER 13
ACTION TO OVERCOME A PSYCHOLOGICAL BARRIER 20
CULTURAL BARRIER 19
ILLUSTRATIONS OF PHYSICAL DISTANCE 9
BARRIERS OF AUDIO/VISUAL DISTORTION 10
BARRIERS OF COMPLEXITY OR ORGANIZATION (HIERARCHICAL) STRUCTURE 12
DISADVANTAGES OF EXCESSIVE COMMUNICATION 11
TWO TYPES OF COMMUNICATION FAILURE ATTRIBUTAL TO DISPARITY IN RANK 17
PERCEPTUAL BARRIER 16
CONCEPTUAL BARRIER 18
DEFINITION OF PHYSICAL COMMUNICATION BARRIERS 8
DEFINITION OF CONCEPT OF PSYCHOLOGICAL BARRIER 15
FAILURE IN COMMUNICATION RESULTING FROM A DEFICIENCY IN DETECTING OR DECODING 7
FACTORS AFFECTING MESSAGE DETECTION 5
FACTORS AFFECTING MESSAGE DECODING 6
COMPONENTS OF A MESSAGE AND THE ASPECTS OF THE COMMUNICATION PROCESS 4
CONDITIONS UNDER WHICH EFFECTIVE COMMUNICATION OCCURS 3
ASPECTS OF COMMUNICATION PROCESS 1
COMPONENTS OF A MESSAGE 2

CONTENT MAP BY OBJECTIVES

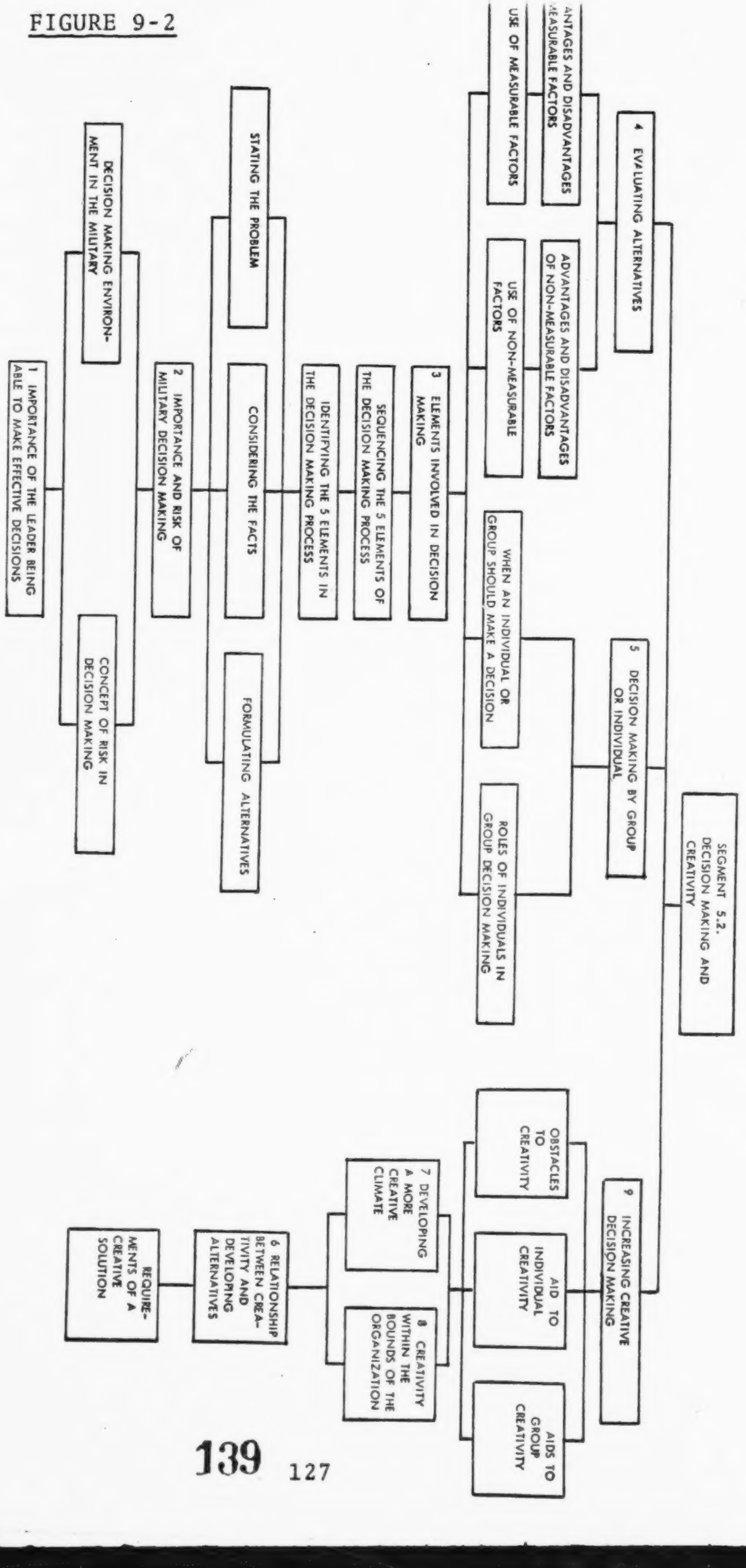
7/22/70

FIGURE 9-1


SEGMENT 5.4
PLANNING
10 APPROPRIATE PLANNING SEQUENCE
7 TECHNIQUES USED IN FORECASTING
8 THE FIVE BASIC ACTIONS OF ESTIMATING
9 PLAN PREPARATION
WHEN ESTIMATING PHASE OF PLANNING BEGINS
DESCRIPTION OF THE FIVE BASIC ACTIONS INVOLVED IN ESTIMATING
DEFINITION OF FORECASTING
DESCRIPTION OF TECHNIQUES FOR FORECASTING
DEFINITION OF PLAN PREPARATION
DESCRIPTION OF PLAN PREPARATION
4 SELECTION OF APPROPRIATE PROGRAM TO PUT PLAN INTO EFFECT
5 AMOUNT OF TIME AND EFFORT TWO LEADERS AT DIFFERENT LEVELS SPEND PLANNING
6 TYPE OF PLAN AND ORGANIZATIONAL LEVEL WHERE PLAN WAS MADE
RELATIONSHIP BETWEEN PLANNING, PROGRAMING AND BUDGETING
DIFFERENCE BETWEEN PLANNING AND PROGRAMING
LEVEL OF ORGANIZATION WHERE PLAN WAS MADE
2 OVERPLANNING AND UNDERPLANNING SITUATIONS
3 SELECTION OF APPROPRIATE PLAN (LONG/SHORT RANGE) FOR AN OBJECTIVE
CHARACTERISTICS OF UNDERPLANNING
CHARACTERISTICS OF OVERPLANNING
RELATIONSHIP OF LONG-RANGE AND SHORT-RANGE PLANNING TO MILITARY
PLAN DESIGNED FROM KNOWLEDGE OF ENEMY'S PLANS
DEFINITION OF UNDERPLANNING
DEFINITION OF OVERPLANNING
LONG-RANGE PLANNING
SHORT-RANGE PLANNING
1 DEFINITION OF PLANNING

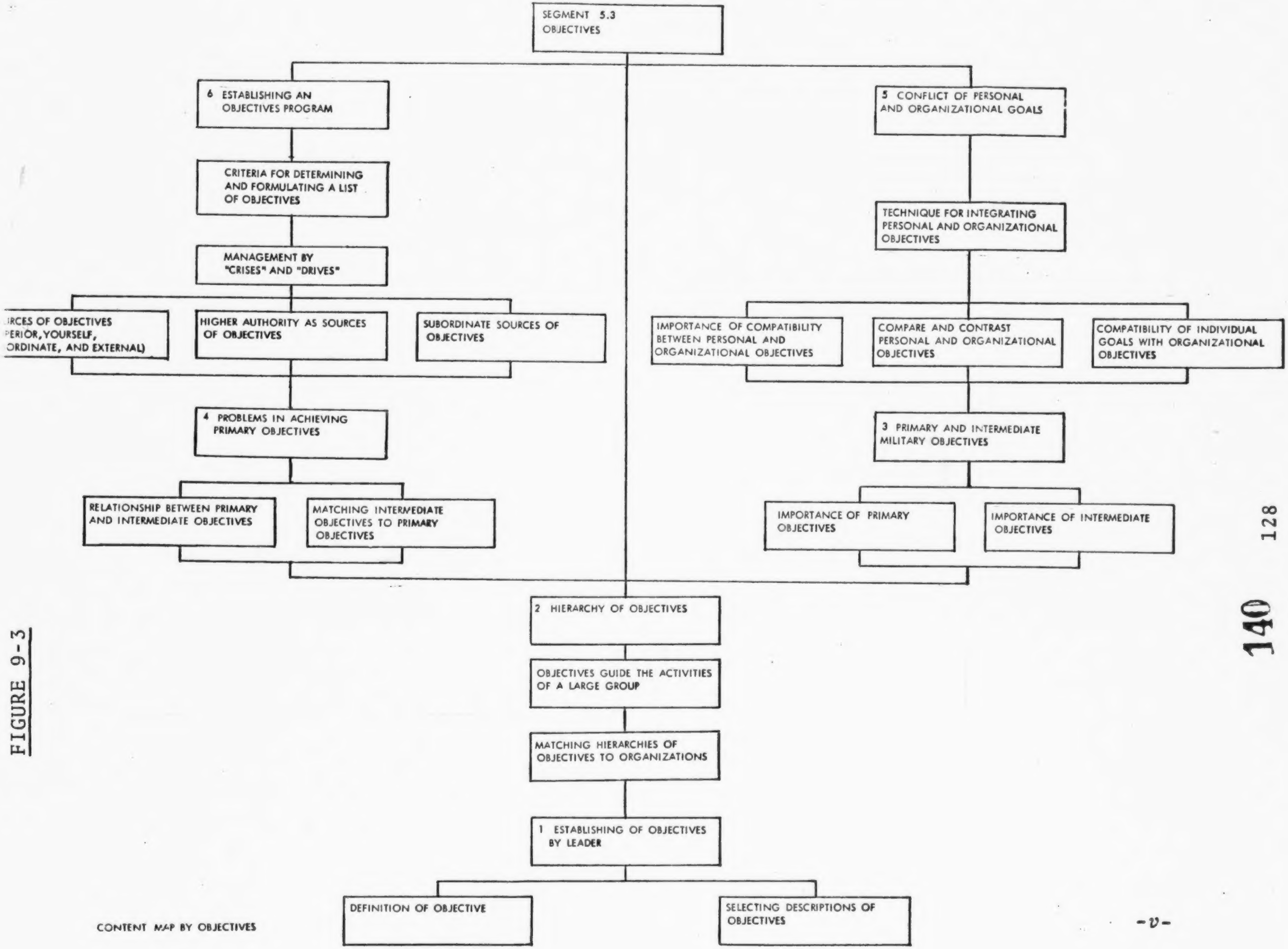
CONTENT MAP BY OBJECTIVES

FIGURE 9-2


SEGMENT 5.2. DECISION MAKING AND CREATIVITY
4 EVALUATING ALTERNATIVES
ANTAGES AND DISADVANTAGES
MEASURABLE FACTORS
USE OF MEASURABLE FACTORS
ADVANTAGES AND DISADVANTAGES OF NON-MEASURABLE FACTORS
USE OF NON-MEASURABLE FACTORS
3 ELEMENTS INVOLVED IN DECISION MAKING
SEQUENCING THE 5 ELEMENTS OF THE DECISION MAKING PROCESS
IDENTIFYING THE 5 ELEMENTS IN THE DECISION MAKING PROCESS
STATING THE PROBLEM
CONSIDERING THE FACTS
FORMULATING ALTERNATIVES
2 IMPORTANCE AND RISK OF MILITARY DECISION MAKING
DECISION MAKING ENVIRONMENT IN THE MILITARY
CONCEPT OF RISK IN DECISION MAKING
1 IMPORTANCE OF THE LEADER BEING ABLE TO MAKE EFFECTIVE DECISIONS
5 DECISION MAKING BY GROUP OR INDIVIDUAL
WHEN AN INDIVIDUAL OR GROUP SHOULD MAKE A DECISION
ROLES OF INDIVIDUALS IN GROUP DECISION MAKING
9 INCREASING CREATIVE DECISION MAKING
OBSTACLES TO CREATIVITY
AID TO INDIVIDUAL CREATIVITY
AIDS TO GROUP CREATIVITY
7 DEVELOPING A MORE CREATIVE CLIMATE
8 CREATIVITY WITHIN THE BOUNDS OF THE ORGANIZATION
6 RELATIONSHIP BETWEEN CREATIVITY AND DEVELOPING ALTERNATIVES
REQUIREMENTS OF A CREATIVE SOLUTION

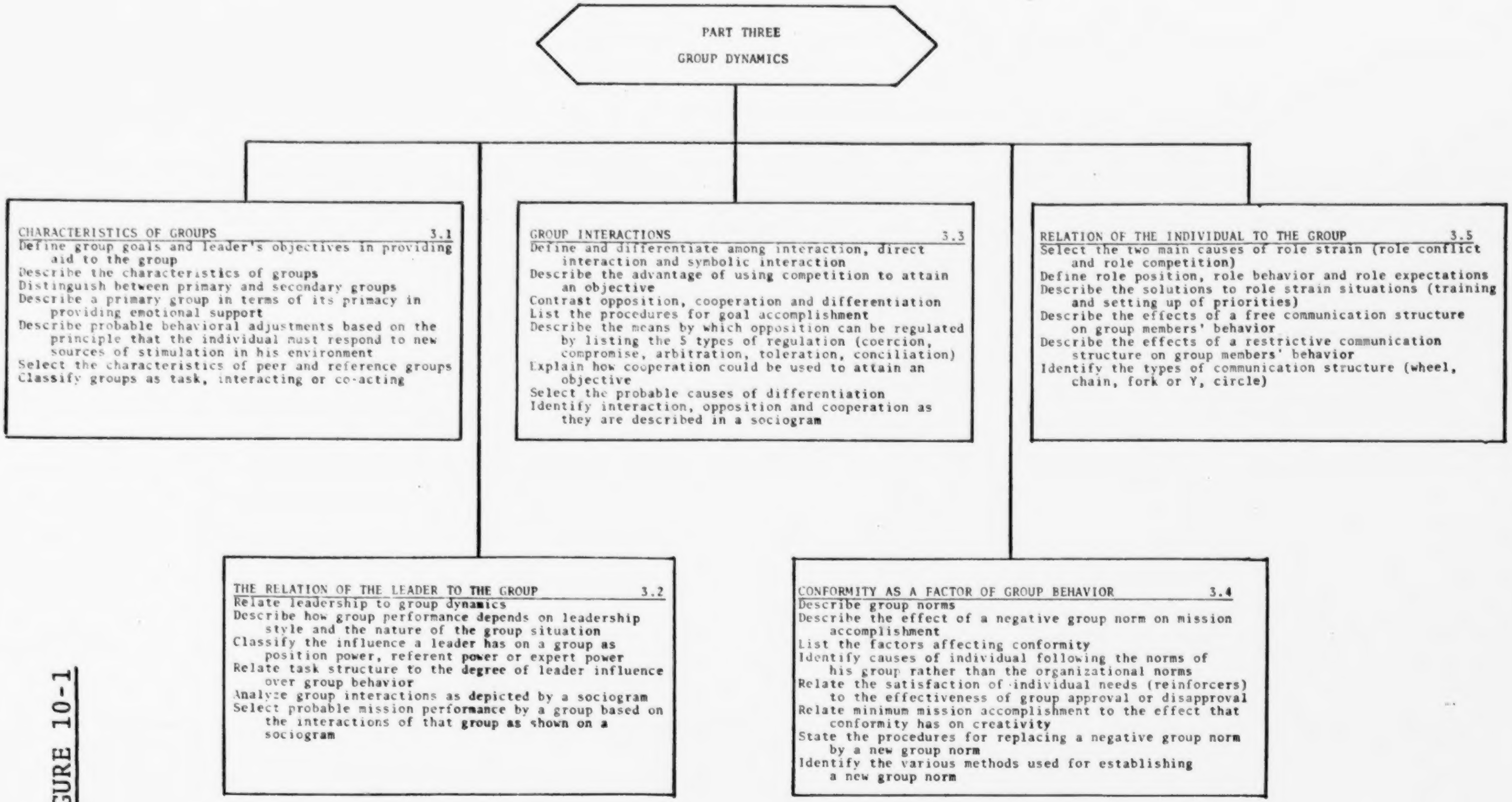
NTENT MAP BY OBJECTIVES

FIGURE 9-3


SEGMENT 5.3 OBJECTIVES
6 ESTABLISHING AN OBJECTIVES PROGRAM
CRITERIA FOR DETERMINING AND FORMULATING A LIST OF OBJECTIVES
MANAGEMENT BY "CRISES" AND "DRIVES"
RCES OF OBJECTIVES PERIOR, YOURSELF, ORDINATE, AND EXTERNAL)
HIGHER AUTHORITY AS SOURCES OF OBJECTIVES
SUBORDINATE SOURCES OF OBJECTIVES
4 PROBLEMS IN ACHIEVING PRIMARY OBJECTIVES
RELATIONSHIP BETWEEN PRIMARY AND INTERMEDIATE OBJECTIVES
MATCHING INTERMEDIATE OBJECTIVES TO PRIMARY OBJECTIVES
5 CONFLICT OF PERSONAL AND ORGANIZATIONAL GOALS
TECHNIQUE FOR INTEGRATING PERSONAL AND ORGANIZATIONAL OBJECTIVES
IMPORTANCE OF COMPATIBILITY BETWEEN PERSONAL AND ORGANIZATIONAL OBJECTIVES
COMPARE AND CONTRAST PERSONAL AND ORGANIZATIONAL OBJECTIVES
COMPATIBILITY OF INDIVIDUAL GOALS WITH ORGANIZATIONAL OBJECTIVES
3 PRIMARY AND INTERMEDIATE MILITARY OBJECTIVES
IMPORTANCE OF PRIMARY OBJECTIVES
IMPORTANCE OF INTERMEDIATE OBJECTIVES
2 HIERARCHY OF OBJECTIVES
OBJECTIVES GUIDE THE ACTIVITIES OF A LARGE GROUP
MATCHING HIERARCHIES OF OBJECTIVES TO ORGANIZATIONS
1 ESTABLISHING OF OBJECTIVES BY LEADER
DEFINITION OF OBJECTIVE
SELECTING DESCRIPTIONS OF OBJECTIVES

CONTENT MAP BY OBJECTIVES

Figures 9-1, 9-2, and 9-3, were abandoned and removed from the instructional material and were replaced by a simpler format for inclusion in the Student Guide (Figures 10-1, 10-2). The central issue for discussion here is the relative value of the maps as developmental tools. Whether formally constructed before, during, or after the writing of objectives, they yield a product which has several advantages. The first advantage is that they summarize in a simple fashion complex content for quick assimilation. A new staff member or a non-project reviewer can quickly comprehend content details. Secondly, the structure, in its graphic form by whatever convention seems appropriate, establishes the fact that the materials are indeed logically ordered. Finally, they serve both as a test and a tool of congruence between content, objectives, and instructional materials.



PART THREE
GROUP DYNAMICS

CHARACTERISTICS OF GROUPS 3.1
Define group goals and leader's objectives in providing aid to the group
Describe the characteristics of groups
Distinguish between primary and secondary groups
Describe a primary group in terms of its primacy in providing emotional support
Describe probable behavioral adjustments based on the principle that the individual must respond to new sources of stimulation in his environment
Select the characteristics of peer and reference groups
Classify groups as task, interacting or co-acting

THE RELATION OF THE LEADER TO THE GROUP 3.2
Relate leadership to group dynamics
Describe how group performance depends on leadership style and the nature of the group situation
Classify the influence a leader has on a group as position power, referent power or expert power
Relate task structure to the degree of leader influence over group behavior
Analyze group interactions as depicted by a sociogram
Select probable mission performance by a group based on the interactions of that group as shown on a sociogram

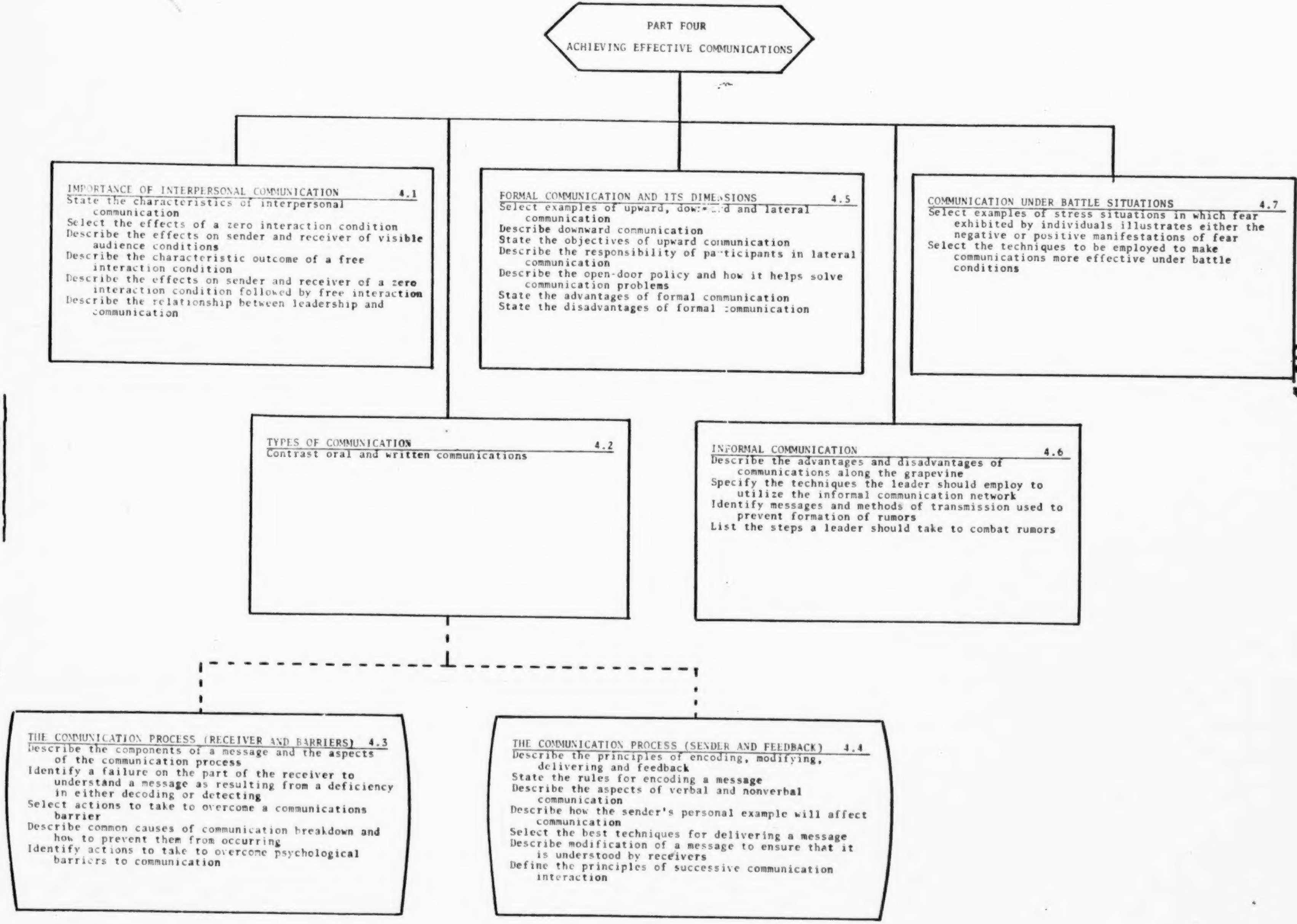
GROUP INTERACTIONS 3.3
Define and differentiate among interaction, direct interaction and symbolic interaction
Describe the advantage of using competition to attain an objective
Contrast opposition, cooperation and differentiation
List the procedures for goal accomplishment
Describe the means by which opposition can be regulated by listing the 5 types of regulation (coercion, compromise, arbitration, toleration, conciliation)
Explain how cooperation could be used to attain an objective
Select the probable causes of differentiation
Identify interaction, opposition and cooperation as they are described in a sociogram

CONFORMITY AS A FACTOR OF GROUP BEHAVIOR 3.4
Describe group norms
Describe the effect of a negative group norm on mission accomplishment
List the factors affecting conformity
Identify causes of individual following the norms of his group rather than the organizational norms
Relate the satisfaction of individual needs (reinforcers) to the effectiveness of group approval or disapproval
Relate minimum mission accomplishment to the effect that conformity has on creativity
State the procedures for replacing a negative group norm by a new group norm
Identify the various methods used for establishing a new group norm

RELATION OF THE INDIVIDUAL TO THE GROUP 3.5
Select the two main causes of role strain (role conflict and role competition)
Define role position, role behavior and role expectations
Describe the solutions to role strain situations (training and setting up of priorities)
Describe the effects of a free communication structure on group members' behavior
Describe the effects of a restrictive communication structure on group members' behavior
Identify the types of communication structure (wheel, chain, fork or Y, circle)

FIGURE 10-1

FIGURE 10-2



PART FOUR
ACHIEVING EFFECTIVE COMMUNICATIONS

IMPORTANCE OF INTERPERSONAL COMMUNICATION 4.1
- State the characteristics of interpersonal communication
- Select the effects of a zero interaction condition
- Describe the effects on sender and receiver of visible audience conditions
- Describe the characteristic outcome of a free interaction condition
- Describe the effects on sender and receiver of a zero interaction condition followed by free interaction
- Describe the relationship between leadership and communication

TYPES OF COMMUNICATION 4.2
- Contrast oral and written communications

THE COMMUNICATION PROCESS (RECEIVER AND BARRIERS) 4.3
- Describe the components of a message and the aspects of the communication process
- Identify a failure on the part of the receiver to understand a message as resulting from a deficiency in either decoding or detecting
- Select actions to take to overcome a communications barrier
- Describe common causes of communication breakdown and how to prevent them from occurring
- Identify actions to take to overcome psychological barriers to communication

THE COMMUNICATION PROCESS (SENDER AND FEEDBACK) 4.4
- Describe the principles of encoding, modifying, delivering and feedback
- State the rules for encoding a message
- Describe the aspects of verbal and nonverbal communication
- Describe how the sender's personal example will affect communication
- Select the best techniques for delivering a message
- Describe modification of a message to ensure that it is understood by receivers
- Define the principles of successive communication interaction

FORMAL COMMUNICATION AND ITS DIMENSIONS 4.5
- Select examples of upward, downward and lateral communication
- Describe downward communication
- State the objectives of upward communication
- Describe the responsibility of participants in lateral communication
- Describe the open-door policy and how it helps solve communication problems
- State the advantages of formal communication
- State the disadvantages of formal communication

INFORMAL COMMUNICATION 4.6
- Describe the advantages and disadvantages of communications along the grapevine
- Specify the techniques the leader should employ to utilize the informal communication network
- Identify messages and methods of transmission used to prevent formation of rumors
- List the steps a leader should take to combat rumors

COMMUNICATION UNDER BATTLE SITUATIONS 4.7
- Select examples of stress situations in which fear exhibited by individuals illustrates either the negative or positive manifestations of fear
- Select the techniques to be employed to make communications more effective under battle conditions

This chapter has detailed the various conceptual and practical complexities that were involved in the definition of objectives and their sequencing. For purposes of the development model, it might be suggested that this step of the development process is hindered by the limitations of the state of the art in cognitive theories of learning. Any mistakes that are made in assessing the construction, placement, or sequencing of objectives becomes manifest first when test item development begins. The writers of test items can attest to the clarity and specificity of objectives when they actually attempt to generate items based on the prepared objectives. After this test, the value of the prepared objectives awaits student performance data. Here is the critical test since in the preparation of objectives, assumptions were made about the methodology both for presentation of content and for eliciting desired behavior. The failure of students to perform at criterion levels may, at times, be traced to poor objective definition and sequencing.

An interesting final note on objectives is that no one, in the course of the project, questioned the necessity of objectives. They were ignored by some, but were never the center of controversy that is sometimes generated when instructors or other educators feel their subject province invaded, threatened, or at least diminished by the use of behavioral objectives.

IV. RATIONALE FOR STRATEGIES, MEDIA SELECTION, AND INSTRUCTIONAL SYSTEMS DESIGN

Abstract

This section discusses the evolution of the instructional systems design from a conceptual model through several iterations to yield a final course.

IV. RATIONALE FOR STRATEGIES, MEDIA SELECTION, AND INSTRUCTIONAL SYSTEMS DESIGN

The General Model

In 1969, the AV Communication Review carried an article in its Spring release that generated much critical discussion. "A Behavioral Approach to Instruction Design and Media Selection" made the bold statement that all media functioned as "cans" transporting the instructional message but not significantly altering that message. Such a notion was contrary to the McLuhan concept of message modification by media which had become an integral part of the mass culture during the 1960's. The authors, Tosti and Ball, of Westinghouse Learning Corporation, based their paper on documentation that had already been submitted as part of the project design documentation for the OE/USNA Leadership Multimedia project. The paper further suggested that media selection should be based on variables other than gross media by generic or specific type. They suggested that the purposes of instruction are better served by attention to those presentation variables that are characteristic of the media. Thus the ability of a medium to allow questions, to present information in a persistent or transient format, to manage student movement through the instruction, were more significant than media per se.

This position was first suggested in the proposal for the project and in the first technical report submitted during the design stage. It was the pivotal component of the project design since it functioned both as the fundamental hypothesis of the research design and as guideline for the course development model and system. It served both the research activity and the course system by offering very discrete and manageable instructional variables for experimentation to the former, and, to the latter, an eminently logical theoretical construct for planning an instructional system. It was therefore unfortunate that during the life of the project a contention grew out of the notion that the project was serving two masters alternatively and satisfying neither. Specifically, some considered that the research effort testing the validity of the Tosti-Ball model,interfered with the proper development of various aspects of course development -- i.e., media choice, content definition and the course system. The research became a kind of scapegoat. Such a myth was unwittingly encouraged when, in the absence of clear empirical evidence to decide differences of opinion, research methodology was offered as a method of resolving the issue. (See Chapter VIII for further discussion.)

In reality, if there had been no research effort to test specific hypothesis of the Tosti-Ball model, the constraints that would have derived both by the logical construct of a media model and the systems requirement for any rigorous course system development would have created some discontent.

Although the research data were to indicate that the Tosti-Ball thesis on effectiveness of varied presentational forms was not productive for this type of course, its value as method or rationale seems, even now, to have great merit as a pioneering focus for considering the many variables that must be thought through for media selection and development work.

Their thesis started with the complaint that the major fault in instruction design today was the frequent failure to appreciate the distinction between three separate design elements: the medium, the presentation, and the method used in preparing the presentation. The authors took the position that the medium was no more than the "can" in which the presentation is delivered and that every medium or media mix is superior to every other one for conveying some specific presentation form.

This was of particular importance in the design, since the quality of such a system cannot be defined in terms of its content or aspects of information delivery but only in terms of change in student behaviors.

Their report assumed that the behavioral approach to instructional design has been adequately validated. However, the authors modified this approach by separating the design of the presentation from the design of the operational system (which includes considerations of the medium) and have included student repertoire shaping as a parallel development.

Three design possibilities for overcoming media limitations were offered:

1. the mixing of media simultaneously or sequentially to overcome the limitations of a single medium (derived from presentation design)
2. the modification of the behavior of the student to compensate for the limitations of the medium (derived from student shaping design)
3. employing whatever is available and being willing to settle for the resulting attenuation of the learner's output (null case)

A significant part of the behavioral approach to instructional design was the engineering of presentation. Presentation design was discussed in terms of the following five dimensions:

1. the encoding form for the information
2. response demand characteristics of the presentation
3. management of presentation
4. duration of presentation
5. distribution of presentation

Their instructional design model stated below relied on three informal hypotheses for its strength.

1. Behavior engineering is a practical science.
2. Media are best characterized in terms of limitation as opposed to advantages.
3. Presentation form and media-mix are independent.

It was proposed that an engineering approach rather than a psychometric approach be taken in the development of instructional systems. That is, rather than measuring students and selecting those who best fit, it seemed more advantageous to design a system in which necessary presentation is available for anyone.

The developmental system, then, should start with specific emphasis on the two important areas: presentation design and media selection.

The Engineering of Presentation Forms

Step 1. Determine the nature of the problem by interview, observation, or research. Establish general goals to solve the problem.

Step 2. Determine the specific behaviors to be established and the entering behavior of the students.

Step 3. Deduce the presentation factors which produce the desired behavioral effect employing established evidence in learning. Then analyze or synthesize the generalized response sets which may be employed by the student in his response to the presentation.

Step 4. Select media which fit the presentation requirements. Media selection must be done in terms of eliminating media which limit or otherwise adversely affect the presentation design rather than specifying advantageous media. Then assemble an operational instructional systems package (media mix).

Step 5. Determine strategy for introduction of the operational system into the instructional environment.

If possible, each step imposed as few constraints as possible on the preceding step. The final system was to be extended to handle all constraints, but the fewer constraints imposed, such as prior medium selection, etc., the better and less expensive will be the resulting system.

It was felt that other media researchers to date had not chosen to distinguish a presentation form from the media which carry it. The new model required that such a separation be made.

Presentation forms were structured to communicate all data (stimulus, response, system control, student control) necessary for an efficient student-system interface. The hypothesis stated repeatedly that a student does not learn from the media, he learns from the presentation form.

The authors' background in programmed instruction suggested the use of presentation forms in the programmed instructional form. Since the typical PI presentation is highly structured, the following aspects of the Tosti-Ball model were derived:

1. The stimuli are presented in a verbal or illustrated form.
2. A demand of a written or selection response is made.

3. The presentation lasts as long as the student desires.
4. The student must make some response before proceeding to the next item.

After experiments in developing programmed materials for several years and using them in the Behavior Systems Division of WLC,the need for a separate presentation design became clear to the authors.

A resulting operational system employed PI texts, group discussions, progress check tests, and various high probability motivation activities, such as chess, as the instructional media. The system was so successful that almost any medium could be thrown in -- books, lectures, exercise sheets -- in place of the PI workbooks, and the system still worked. After such long devotion to the careful analysis of the stimulus and the response aspects of presentation, it was found that other factors, such as instructional management, could compensate for poor design. This forced the designers to cease considering PI as being synonymous with the workbook medium and to consider PI as a presentation form.

On the surface, considering the limitations of media may seem to be nothing more than the reverse of stating the advantages of media. The difference was subtle but important. Two media may fit the general requirements of the presentation, but each has different limitations. It may be easier to compensate for the limitations of Medium A than of Medium B. Hence Medium A should be selected. Quite often, however, Medium B has an aura of advantage surrounding it. It is multi-sensory, it is new, it has been successfully used in other settings, or it has gotten great press reviews, etc. The novice designer may, therefore, incorrectly select Medium B because of its intrinsic advantages.

The assertion that media limitations are the key to proper media selection does not outlaw at least two special cases where media advantages should be used. Suppose the situation arises where at least two media have almost equivalent limitations for a given presentation design. Then, if one medium has the advantages of greater student experience or preference over the other medium, this should be a consideration in the actual media selection.

Additional appeal for the model came because of its reaction in mechanistic and poorly designed instruction. It castigated equipment that frequently was out of service, had poor resolution, and often required additional simulation support by humans behind a curtain. Since these media limitations were so obvious and because human simulators were lazy, many ways had to be found to engineer the student's behavior to compensate for the limitations of the devices.

Tosti and Ball felt that equipment didn't necessarily have to be sophisticated. That is, equipment did not need to be designed around the limitations of human behavior as the equipment engineers might see them. Many equipment features, such as embellishment of student response modes, were labeled bad because they attempted to replace simple behavioral tasks which could be more easily handled with a behavioral engineering approach. Thus, although an "engineering" thesis, it was humanistic.

A five-dimension classification scheme of presentational factors was devised as an attempt at proper presentational engineering. These dimensions are listed, followed by the rationale:

1. encoding forms. Data must be encoded in some stimulus form. Although this dimension is nominal, the categories can be arranged in a hierarchy according to an increasing level of abstraction.
2. reponse demand characteristics of the presentation. This is another nominal dimension which includes covert, selective, constructed, verbal, motor, or affective responses.
3. presentational management. This dimension is ordinal and is ordered according to the relative frequency of the decision to modify the presentation. The activity of management in deciding to modify the presentation is made on the basis of some assessment of the student or his environment. One may manage objective-oriented activities by providing learning tasks, remedial exercises or enrichment activities, or one may manage motivation by providing high

probability contingency activities.

4. duration. Presentation varies on this ordinal dimension from transient to persistent depending upon the duration of the stimulus. Movies usually are conveyors of more transient presentation, and texts display relatively persistent ones. In a classroom, presentation by lecture is more transient than one which is delivered by the blackboard.
5. distribution. This is the ordering, grouping, and sequencing of behavioral items and the temporal spacing between such items.

FIGURE 11

Dimensions of Presentation

The dimensions were summarized as follows:

Encoding	Response Demand
Environmental Structure	Covert
Pictorial	Selective
Symbolic	Constructed
Verbal	Vocal
	Motor
	Affective

Presentation Management	Duration
Frequent	Transient
↑	↑
Frequency of decision to change presentation	Length of time the presentation remains intact
↓	↓
Fixed pace	Persistent

Behaviorally structured	Unstructured

Distribution

This first section of the chapter has attempted to specify some of the theoretical constructs of the model for media and presentation design. Hopefully, it conveyed some of the spirit of excitement that was generated by the notion that a significant contribution to educational methodology was in the making.

Research Variables

This section discusses the transitional, developmental process where the theoretical framework just summarized was converted through a series of iterative revision into the final course product described in the last section of this chapter. It is of no small importance that some statement be made regarding the process whereby a conceptual framework for instructional strategies and instructional systems design is translated into a viable operational system.

On the other hand, it would be presumptuous for this section of the report to pretend to offer insight that usurps the careful analysis of these research efforts which attempted, through the most rigorious methodology possible, to define optimum instructional design. These efforts have been reported in:

TR-6.11 - An Analysis and Evaluation of Instructional Methodology For A Multi-Media Course in Leadership, Psychology, and Management Phase II Evaluation Report

TR-6.12a - Report of Phase II Research Findings: The Design and Methodology For Research On The Interaction Of Media, Conditions Of Instruction, And Student Characteristics For A Multi-Media Course in Leadership, Psychology and Management, Part I: Conditions of Instruction

TR-6.12b - Report of Phase II Research Findings: The Design and Methodology For Research On The Interaction Of Media, Conditions Of Instruction, And Student Characteristics For A Multi-Media Course In Leadership, Psychology and Management, Part II: Student Characteristics

TR-6.13 - Design Specifications Document Including Specifications For Product And Course Design System Management And Evaluation Procedures

TR-6.15 - An Analysis and Evaluation Of Instructional Methodology For A Multi-Media Course In Leadership, Psychology, and Management Phase III Evaluation Report and,

TR-6.16 - Report of Phase III Research Findings: For A Multi-Media Course in Leadership, Psychology and Management .

However, since those documents may be not readily available,a summation of the findings is justified here. Should this discussion raise questions as to either the validity of the data or the wisdom of the interpretations, the reader is directed to those reports cited.

The efforts to implement the Tosti-Ball model to fulfill project responsibility for determining a media selection procedure began as research and evaluation plans [TR 6.3a] were prepared. This two part document outlines the procedures and methodology to be employed in evaluating the proposed instructional system and learning modules for the leadership management course. The research investigation expressed the intention of determining if the Tosti-Ball model of presentation variables could be effectively employed as the basis for media selection. Where possible, media would be compared, but since the express contention of the theoretical model was the importance of presentation variables, there was never any concerted effort to explore the relative value of media,qua media.

The variables to be considered were student variables, task variables, and presentation design variables.

The student variables to be considered were to be drawn from standard tests, such as the Edwards Personal Preference Schedule, the Sixteen Personality Factors Scale, the Ohio State Psychological, and the Strong Vocational Interest Blank. Other variables which were to be looked at for their value as performance predictors were the standard college entrance scores (SAT verbal and math, English Composition, and Math Achievement), and information derived from a questionnaire prepared for the students (see Appendix F). A detailed list of all items covering the student variables is available in Appendix A, Part One, of this report.

While there would be an attempt to identify variables predicting final course achievement, the main thrust of the investigation was oriented toward performance with particular presentation variables in selected media. Additionally, where predicted variables could relate to performance with particular media, some analysis would be done. Overall, it was the intention to examine the relationship between alternative conditions of instruction design for the same subject matter to compare the relationships to student variables and to discover interactions between method and student. A more detailed summary of the rationale for student variables is available in Part One of this final report, pages thirty six through forty.

The task variables to be examined according to the design of the final course product were built around an equating of tasks to the specific learning objectives. An objective was defined as a description of the pattern of behavior or performance that a learner must demonstrate. The objectives or tasks were further defined to be behavioral in nature: i.e., the task performance would be observable and measurable.

It might be noted here that during the course of the project, some confusion persisted over the term "behavioral approach" and its relationship to the investigations and the final course structure. The behavioral approach in no way represents a logical model for a selection process. Rather does it denote a rationale for procedures and methodology of investigation. The behavioral approach suggests that decisions be made on the basis of empirical data derived from observable and measurable performance.

Therefore, in a true sense of the term, there is no relationship between the final course structure and the behavioral approach, although there can be a close scrutiny of the degree to which the behavioral orientation was adhered to. For that matter, one may even wish to argue with the behavioral approach and declare it an invalid procedure for decision making in the educational process. Indeed, there are many who view the application of behaviorism to the educational process with dissatisfaction. They argue that such an approach is mechanistic to the point of reducing human beings, both instructors and learners, to stimulus-response animals, leaving no allowances for higher values and operations. This ideological battle, however, is not an issue here. Behavioral defines an approach whereby a concerted effort is made to obtain performance data whose characteristic is measurable and observable. This project did not exclude other kinds of data of a more subjective nature and it never had any quarrel with human judgement. Within the rationale of the behavioral approach, the project staff sought, wherever possible, to structure the investigation and to reach conclusions through empirical methods.

This discussion of the task variables summarizes what appears in the reports specified on page 148, although it intends to provide sufficient material to make the efforts of the research investigators comprehensible.

The main question raised by the researchers was whether or not presentation variables and media have similar effects on the achievement of different types of objectives. This effort would be facilitated, it was felt, through a classification of "types of learning". Some effort was made to distinquish this term from products of learning. While there was a heavy reliance on the structuring and ordering of objectives through classifications such as Bloom's and Gagne's, it was argued that such classifications referred to products of learning. And, it was further contended, that while there is an obvious relationship between the content products and processes of learning, it was argued that the goal of the project was to concentrate on processes and the relationship between processes and products. Without these distinctions, it would have been necessary for a full discussion and analysis of task variables to include a systematic arraying of content-, product-, and process related variables. While such distinctions may not have great merit for generalized discussions of the educational process, careful investigations must necessarily limit their scope and intentions. The main question, then, to summarize and restate, raised by the classifications of types of learning, is whether or not the presentation variables and media have similar effects on the achievement of different types of objectives.

The primary variables representing different classes of learning, however, were the cumulative posttest [CPT] items developed as special norm-reference research tests. These tests were developed to have an approximately equal number of items representing acquisition of knowledge and application. Thus, for purposes of this investigation, two broad classifications of types of learning were made. Type I represented an acquisition of simple knowledge, while type II represented application of knowledge. As items designed for content validity with high discriminative powers, it was felt that both types of items, representing two distinct types of learning, would tap abilities in Bloom's other categories of comprehension, analysis, synthesis, and evaluation.

Thus, the task variables were limited to two broad classifications of types of learning. While it could be argued that a larger repertoire of learning types should have been included in the investigations, the decision to restrict the types of learning to only two had justification. On consideration of the large scale manipulation of conditions of instruction, the development of tests representing rather large classes of types of learning was felt to be most in keeping with the general design of the research. The finding that particular presentation forms and media had different effects on very narrow classes of behavioral objectives would remove the advantage of instructional design at the macro level: thus, it was desirable to determine if substantial effects on the conditions of instruction could be demonstrated using tests which included items representing several types of learning. Additionally, the finding of different effects with broad classes of objectives would support the procedure for segregating instruction on particular content according to those broad types of learning. Thus, the preparation of instructional units could proceed with relatively easy large scale control of presentation and media as appropriate to the two major classes of learning. There would be no compelling requirement for major analysis at the micro level. Such a procedure seemed the most practical resolution of the condition set forth in the original contract specifications; namely, that material development proceed from an experimental mapping of different media to different objectives within each unit of instruction.

Research Plans and Implementation

At a more detailed level of planning for the implementation of the research effort the following questions were framed.

a. Are substantial effects on student achievement produced by manipulation of presentational variables at the macrotaxonomic level as conceived by Tosti and Ball (1969)?

b. Are substantial differences in student achievement produced between different media delivering the same presentation, when measured over segments of material typical of a unit of instruction in most educational systems?

c. Are variations of conditions of instruction in the presentation design domain of greater or lesser importance than variation in the media domain?

d. Are the effects of presentation and media variables generalizable over different types of instructional objectives, or are different effects produced in relation to the acquisition and application of knowledge?

e. Are effects of particular presentation conditions and media similar for students varying according to established standardized tests of individual differences, or do the optimal conditions of instruction differ for different students?

There would be problems attending to all these objectives within a single ongoing course. It would be necessary to arrange the experimental manipulation of materials and measurements so as to avoid the mutual entanglements of the effects of different experiments. Substantial variation of the level of difficulty in specific course content and test items required control to prevent obscuring of experimental effects. The small number of students available for enrollment in a developmental course required that specific techniques for reducing random variation be employed to increase the precision of the experimental comparisons, but which would not interfere with the investigation of individual differences in relation to experimental variables. On the other hand, the student could not be burdened with complex experimental procedures which might handicap his overall achievement. The ability of the investigators to design a plan which would avoid the pitfalls just mentioned, yet achieve answers to those questions just stated, is a tribute to both their professionalism and their ingenuity. Full details on the experimental design and specific research plans are available in TR 6.12a, Phase II, Research Findings, Part I: The Conditions of Instruction, and TR 6.16, Phase III, Research Findings. For our purposes here in tracing the evolution from the theoretical construct to the final course product, the following items are discussed in summary fashion.

Selection of Media

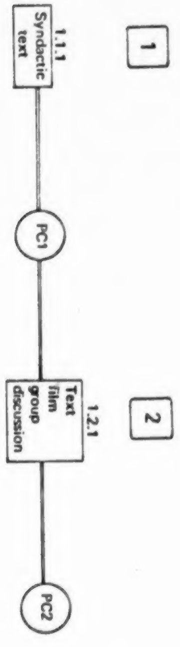
The selection of media and presentation variables for the first implementation of the course was determined, in large measure, by the requirements of the experimental design, capacities needed for delivery of instructional presentation, and the diversity and flexibility expected of an individualized multi-media course. An extensive discussion on these conditions is available in the documents just cited. These reports explain the problems inherent to experimental design which influence both the selection, placement, and sequencing of media. In retrospect, some have argued that the selection of media was arbitrary, or at least so biased by experimental requirements that it had little value in either helping to design a final course system, or to provide a universal media selection strategy for a multi-media course model. These arguments seem predicated on the notion that the research efforts, regardless of the limitation of the variables examined, should yield a universal algorithm for media selection and course design. Secondly, there seems to be an effort to place developmental research in a camp quite apart from standard course development. One comment that was heard raised the complaint, "Yes, the research is fine, but when will we start on the course?" Such a comment failed to understand that the initial course design was set up to test the largest number of variables and conditions of instruction possible with the express intent of continually refining the instructional variables through successive approximations to yield the optimum course structure. Under no conditions was it the intention, nor could it be justified, that the research and evaluation efforts would establish a set number of principles upon which course fabrication would begin. Instead, almost five hundred modules of instruction were prepared with the express purpose of systematically eliminating those conditions of instructions which failed to yield the highest possible performance and which would allow restructure or incorporation of those conditions of instruction which proved valuable. The discussion to follow traces the successive iterations of the experimental test runs to arrive at the final course system.

Initial Results and Revision of Model

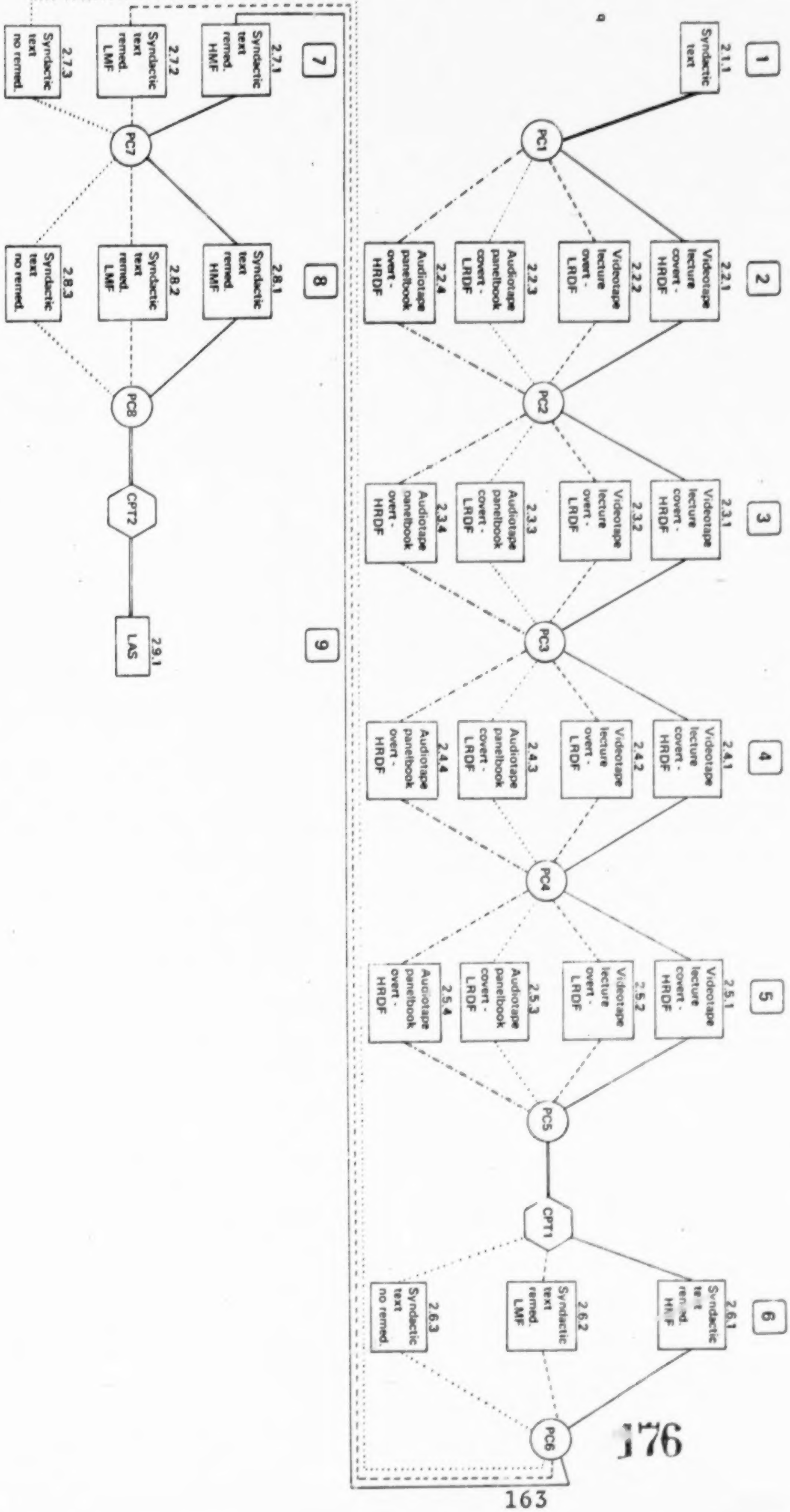
The first run of the course in the spring of 1970 attempted to gather data for subsequent analysis on the various conditions of instruction, their associated media, and student characteristics which might correlate to performance. A summary of the research plan for the spring 1970 run is shown in Figure 12. There will be no discussion here of details on the chart other than to note that a wide variety of media and presentation variables were under scrutiny. Again, details are available in documents previously cited. The outcome of these investigations yielded certain conclusions which were the basis for change in the second implementation in the fall of 1970. The first conclusion derived,which was to be later corroborated in the second run or iteration, was that there was no strong evidence to support the Tosti-Ball theory on the importance of presentation variables. While some differences were found, the overall trend from this series of studies was no significant differences were found when the medium was constant and the presentation design was varied. There were some exceptions. In the linear text the high response demand frequency condition was consistently superior to the low demand frequency condition. Further, there was a trend which indicated that overt selected response condition was slightly better

FIGURE 12

Presentation Design
First Run
Spring 1970


1.1.1
Syndactic text
1
PC1
1.2.1
Text film group discussion
2
PC2

PART ONE
OVERVIEW OF LEADERSHIP



PART TWO
INDIVIDUAL BEHAVIOR

1
2
3
4
5
6
7
8
9
2.1.1 Syndactic text
PC1
2.2.1 Videotape lecture covert - HRDF
2.2.2 Videotape lecture overt - LRDF
2.2.3 Audiotape panelbook covert - LRDF
2.2.4 Audiotape panelbook overt - HRDF
PC2
2.3.1 Videotape lecture covert - HRDF
2.3.2 Videotape lecture overt - LRDF
2.3.3 Audiotape panelbook covert - LRDF
2.3.4 Audiotape panelbook overt - HRDF
PC3
2.4.1 Videotape lecture covert - HRDF
2.4.2 Videotape lecture overt - LRDF
2.4.3 Audiotape panelbook covert - LRDF
2.4.4 Audiotape panelbook overt - HRDF
PC4
2.5.1 Videotape lecture covert - HRDF
2.5.2 Videotape lecture overt - LRDF
2.5.3 Audiotape panelbook covert - LRDF
2.5.4 Audiotape panelbook overt - HRDF
PC5
CPT1
2.6.1 Syndactic text remed. HMF
2.6.2 Syndactic text remed. LMF
2.6.3 Syndactic text no remed.
PC6
2.7.1 Syndactic text remed. HMF
2.7.2 Syndactic text remed. LMF
2.7.3 Syndactic text no remed.
PC7
2.8.1 Syndactic text remed. HMF
2.8.2 Syndactic text remed. LMF
2.8.3 Syndactic text no remed.
PC8
CPT2
2.9.1 LAS

FIGURE 12 cont.

PART THREE
GROUP DYNAMICS

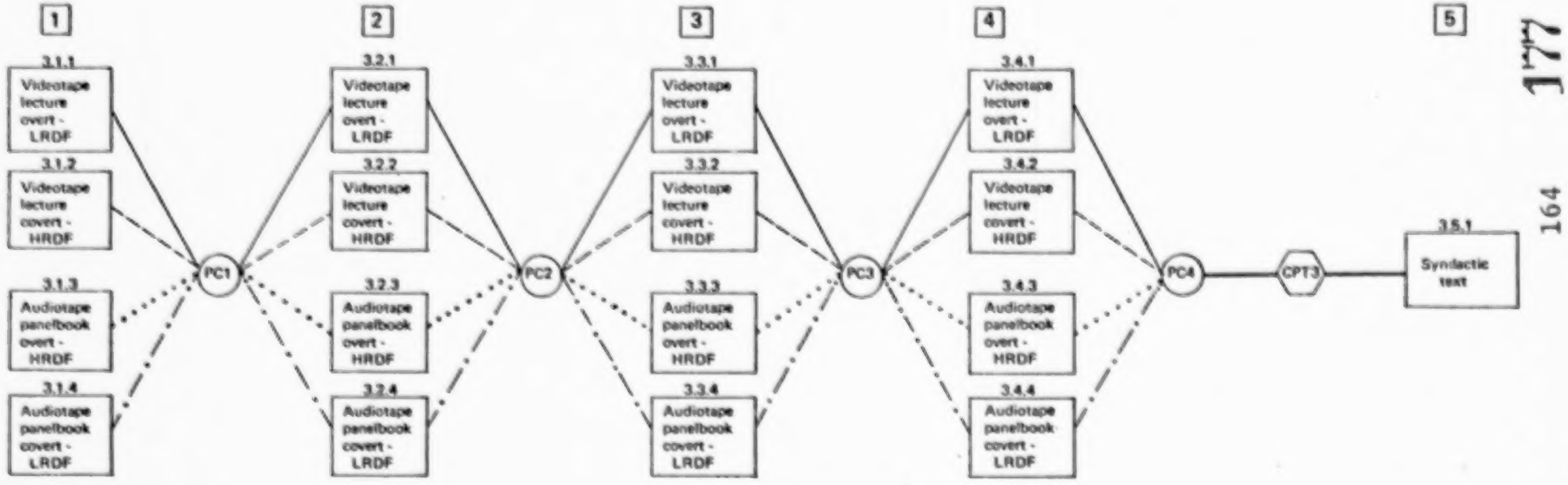

1
2
3
4
5
3.1.1
Videotape lecture overt - LRDF
3.1.2
Videotape lecture covert - HRDF
3.1.3
Audiotape panelbook overt - HRDF
3.1.4
Audiotape panelbook covert - LRDF
PC1
3.2.1
Videotape lecture overt - LRDF
3.2.2
Videotape lecture covert - HRDF
3.2.3
Audiotape panelbook overt - HRDF
3.2.4
Audiotape panelbook covert - LRDF
PC2
3.3.1
Videotape lecture overt - LRDF
3.3.2
Videotape lecture covert - HRDF
3.3.3
Audiotape panelbook overt - HRDF
3.3.4
Audiotape panelbook covert - LRDF
PC3
3.4.1
Videotape lecture overt - LRDF
3.4.2
Videotape lecture covert - HRDF
3.4.3
Audiotape panelbook overt - HRDF
3.4.4
Audiotape panelbook covert - LRDF
PC4
CPT3
3.5.1
Syndactic text

FIGURE 12 cont.

PART FOUR
ACHIEVING EFFECTIVE COMMUNICATION

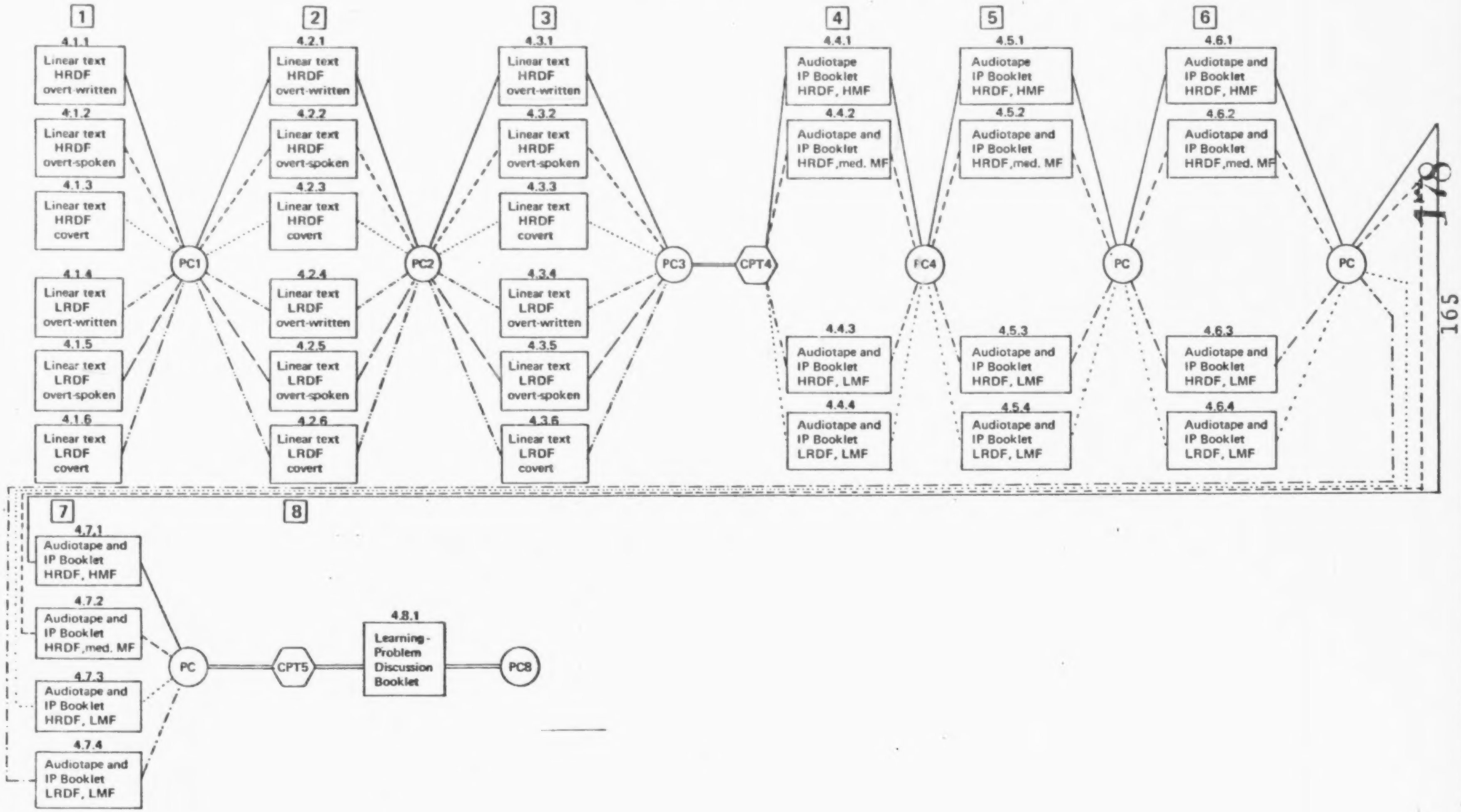

1
4.1.1 Linear text HRDF overt-written
4.1.2 Linear text HRDF overt-spoken
4.1.3 Linear text HRDF covert
4.1.4 Linear text LRDF overt-written
4.1.5 Linear text LRDF overt-spoken
4.1.6 Linear text LRDF covert
PC1
2
4.2.1 Linear text HRDF overt-written
4.2.2 Linear text HRDF overt-spoken
4.2.3 Linear text HRDF covert
4.2.4 Linear text LRDF overt-written
4.2.5 Linear text LRDF overt-spoken
4.2.6 Linear text LRDF covert
PC2
3
4.3.1 Linear text HRDF overt-written
4.3.2 Linear text HRDF overt-spoken
4.3.3 Linear text HRDF covert
4.3.4 Linear text LRDF overt-written
4.3.5 Linear text LRDF overt-spoken
4.3.6 Linear text LRDF covert
PC3
CPT4
4
4.4.1 Audiotape IP Booklet HRDF, HMF
4.4.2 Audiotape and IP Booklet HRDF, med. MF
4.4.3 Audiotape and IP Booklet HRDF, LMF
4.4.4 Audiotape and IP Booklet LRDF, LMF
FC4
5
4.5.1 Audiotape IP Booklet HRDF, HMF
4.5.2 Audiotape and IP Booklet HRDF, med. MF
4.5.3 Audiotape and IP Booklet HRDF, LMF
4.5.4 Audiotape and IP Booklet LRDF, LMF
PC
6
4.6.1 Audiotape and IP Booklet HRDF, HMF
4.6.2 Audiotape and IP Booklet HRDF, med. MF
4.6.3 Audiotape and IP Booklet HRDF, LMF
4.6.4 Audiotape and IP Booklet LRDF, LMF
PC
7
4.7.1 Audiotape and IP Booklet HRDF, HMF
4.7.2 Audiotape and IP Booklet HRDF, med. MF
4.7.3 Audiotape and IP Booklet HRDF, LMF
4.7.4 Audiotape and IP Booklet LRDF, LMF
PC
CPT5
8
4.8.1 Learning-Problem Discussion Booklet
PC8

FIGURE 12 cont.

PART FIVE
MILITARY MANAGEMENT

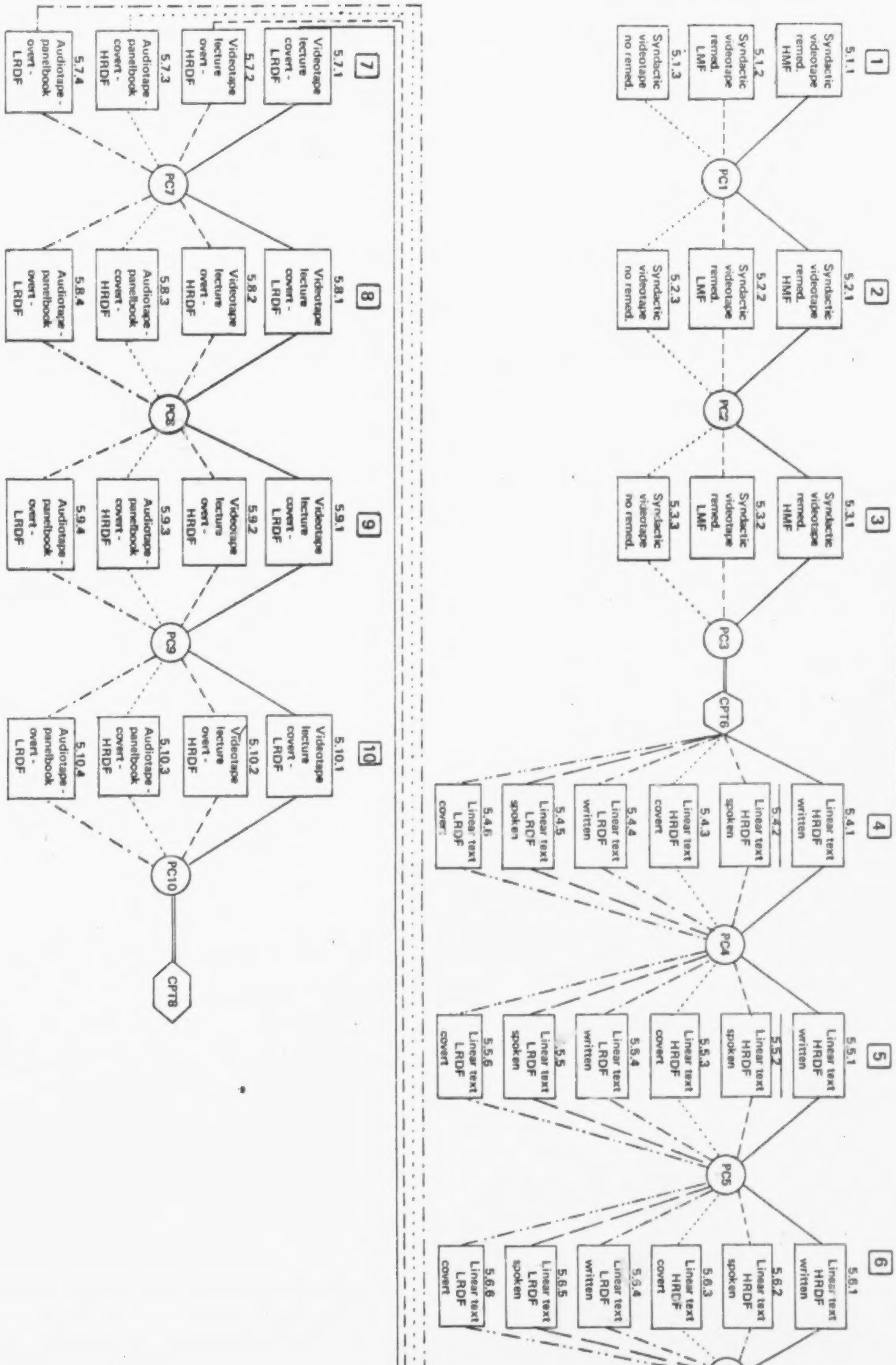

1
5.1.1 Syndactic videotape remed. HMF
5.1.2 Syndactic videotape remed. LMF
5.1.3 Syndactic videotape no remed.
PC1
2
5.2.1 Syndactic videotape remed. HMF
5.2.2 Syndactic videotape remed. LMF
5.2.3 Syndactic videotape no remed.
PC2
3
5.3.1 Syndactic videotape remed. HMF
5.3.2 Syndactic videotape remed. LMF
5.3.3 Syndactic videotape no remed.
PC3
CPT6
4
5.4.1 Linear text HRDF written
5.4.2 Linear text HRDF spoken
5.4.3 Linear text HRDF covert
5.4.4 Linear text LRDF written
5.4.5 Linear text LRDF spoken
5.4.6 Linear text LRDF covert
PC4
5
5.5.1 Linear text HRDF written
5.5.2 Linear text HRDF spoken
5.5.3 Linear text HRDF covert
5.5.4 Linear text LRDF written
5.5.5 Linear text LRDF spoken
5.5.6 Linear text LRDF covert
PC5
6
5.6.1 Linear text HRDF written
5.6.2 Linear text HRDF spoken
5.6.3 Linear text HRDF covert
5.6.4 Linear text LRDF written
5.6.5 Linear text LRDF spoken
5.6.6 Linear text LRDF covert
PC6
CPT8
7
5.7.1 Videotape lecture covert - LRDF
5.7.2 Videotape lecture overt - HRDF
5.7.3 Audiotape - panelbook covert - HRDF
5.7.4 Audiotape - panelbook overt - LRDF
PC7
8
5.8.1 Videotape lecture covert - LRDF
5.8.2 Videotape lecture overt - HRDF
5.8.3 Audiotape - panelbook covert - HRDF
5.8.4 Audiotape - panelbook overt - LRDF
PC8
9
5.9.1 Videotape lecture covert - LRDF
5.9.2 Videotape lecture overt - HRDF
5.9.3 Audiotape - panelbook covert - HRDF
5.9.4 Audiotape - panelbook overt - LRDF
PC9
10
5.10.1 Videotape lecture covert - LRDF
5.10.2 Videotape lecture overt - HRDF
5.10.3 Audiotape - panelbook covert - HRDF
5.10.4 Audiotape - panelbook overt - LRDF
PC10
CPT8

FIGURE 12 cont.

PART SIX
AUTHORITY AND RESPONSIBILITY

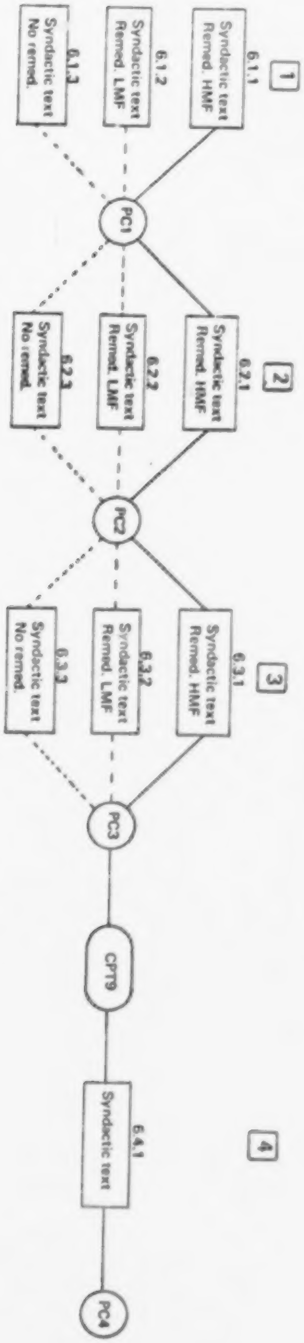
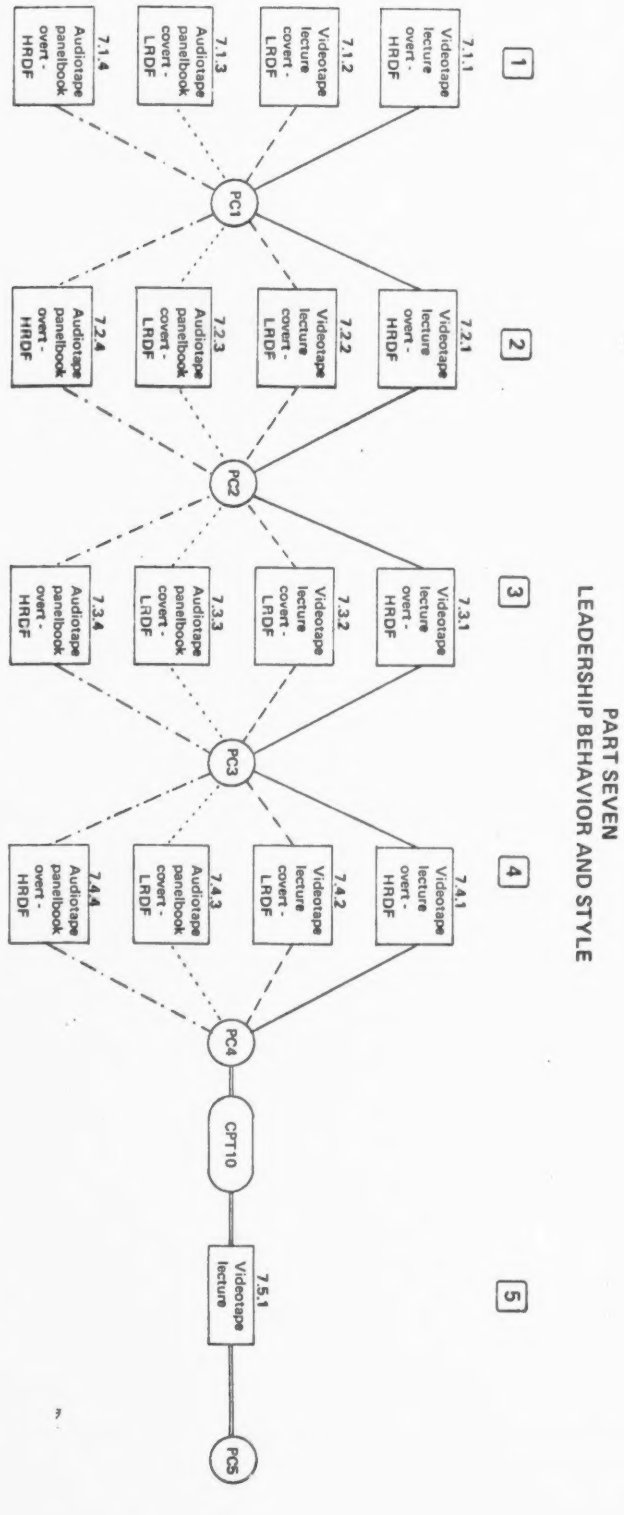

1
6.1.1
Syndactic text
Remed. HMF
6.1.2
Syndactic text
Remed. LMF
6.1.3
Syndactic text
No remed.
PC1
2
6.2.1
Syndactic text
Remed. HMF
6.2.2
Syndactic text
Remed. LMF
6.2.3
Syndactic text
No remed.
PC2
3
6.3.1
Syndactic text
Remed. HMF
6.3.2
Syndactic text
Remed. LMF
6.3.3
Syndactic text
No remed.
PC3
CPT9
4
6.4.1
Syndactic text
PC4

FIGURE 12 cont.


PART SEVEN
LEADERSHIP BEHAVIOR AND STYLE
1
7.1.1 Videotape lecture overt - HRDF
7.1.2 Videotape lecture covert - LRDF
7.1.3 Audiotape panelbook covert - LRDF
7.1.4 Audiotape panelbook overt - HRDF
PC1
2
7.2.1 Videotape lecture overt - HRDF
7.2.2 Videotape lecture covert - LRDF
7.2.3 Audiotape panelbook covert - LRDF
7.2.4 Audiotape panelbook overt - HRDF
PC2
3
7.3.1 Videotape lecture overt - HRDF
7.3.2 Videotape lecture covert - LRDF
7.3.3 Audiotape panelbook covert - LRDF
7.3.4 Audiotape panelbook overt - HRDF
PC3
4
7.4.1 Videotape lecture overt - HRDF
7.4.2 Videotape lecture covert - LRDF
7.4.3 Audiotape panelbook covert - LRDF
7.4.4 Audiotape panelbook overt - HRDF
PC4
CPT10
5
7.5.1 Videotape lecture
PC5

PART EIGHT
SENIOR-SUBORDINATE RELATIONS

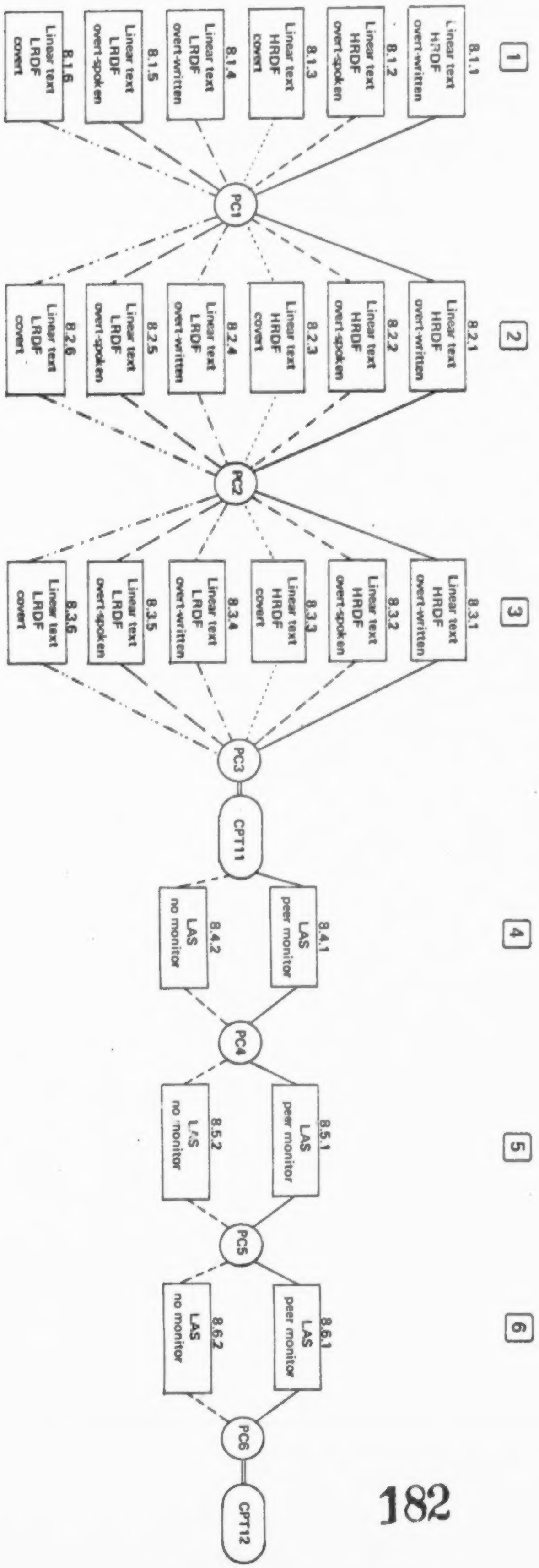
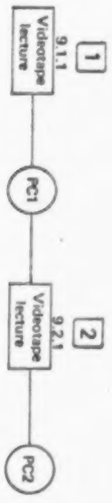
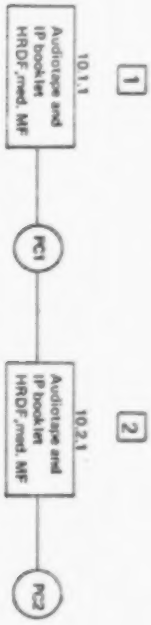

1
8.1.1 Linear text HRDF overt-written
8.1.2 Linear text HRDF overt-spoken
8.1.3 Linear text HRDF covert
8.1.4 Linear text LRDF overt-written
8.1.5 Linear text LRDF overt-spoken
8.1.6 Linear text LRDF covert
PC1
2
8.2.1 Linear text HRDF overt-written
8.2.2 Linear text HRDF overt-spoken
8.2.3 Linear text HRDF covert
8.2.4 Linear text LRDF overt-written
8.2.5 Linear text LRDF overt-spoken
8.2.6 Linear text LRDF covert
PC2
3
8.3.1 Linear text HRDF overt-written
8.3.2 Linear text HRDF overt-spoken
8.3.3 Linear text HRDF covert
8.3.4 Linear text LRDF overt-written
8.3.5 Linear text LRDF overt-spoken
8.3.6 Linear text LRDF covert
PC3
CPT11
4
8.4.1 LAS peer monitor
8.4.2 LAS no monitor
PC4
5
8.5.1 LAS peer monitor
8.5.2 LAS no monitor
PC5
6
8.6.1 LAS peer monitor
8.6.2 LAS no monitor
PC6
CPT12

FIGURE 12 cont.


1
9.1.1
Videotape lecture
PC1
2
9.2.1
Videotape lecture
PC2

PART NINE
MORALE

FIGURE 12 cont.


1
10.1.1
Audiotape and
IP booklet
HRDF, med. MF
PC1
2
10.2.1
Audiotape and
IP booklet
HRDF, med. MF
PC2

PART TEN
DISCIPLINE

FIGURE 12 cont.

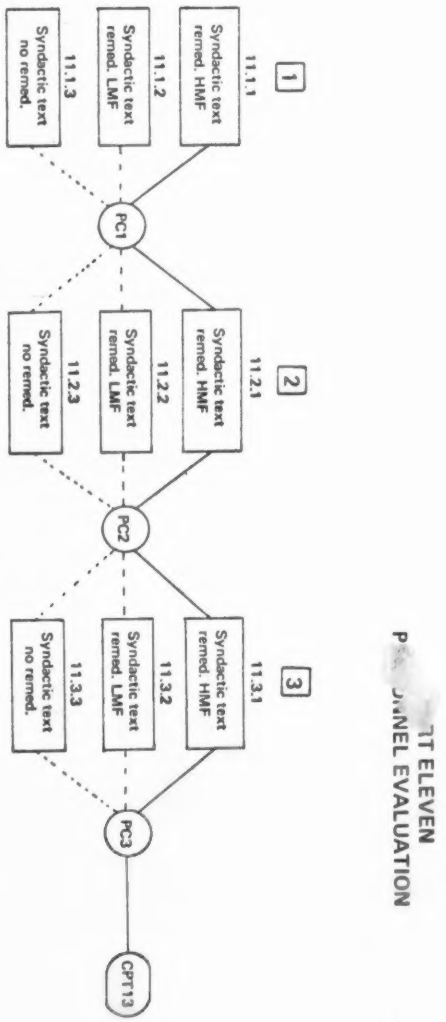
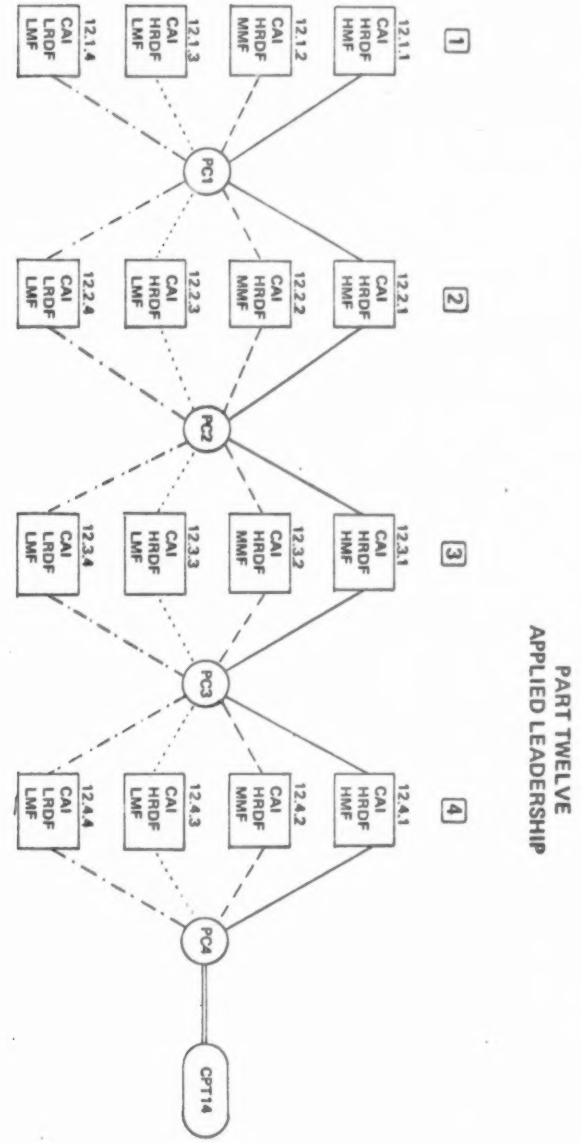

[illegible] T ELEVEN
P[illegible] NNEL EVALUATION
1
11.1.1
Syndactic text remed. HMF
11.1.2
Syndactic text remed. LMF
11.1.3
Syndactic text no remed.
PC1
2
11.2.1
Syndactic text remed. HMF
11.2.2
Syndactic text remed. LMF
11.2.3
Syndactic text no remed.
PC2
3
11.3.1
Syndactic text remed. HMF
11.3.2
Syndactic text remed. LMF
11.3.3
Syndactic text no remed.
PC3
CPT13

FIGURE 12 cont.

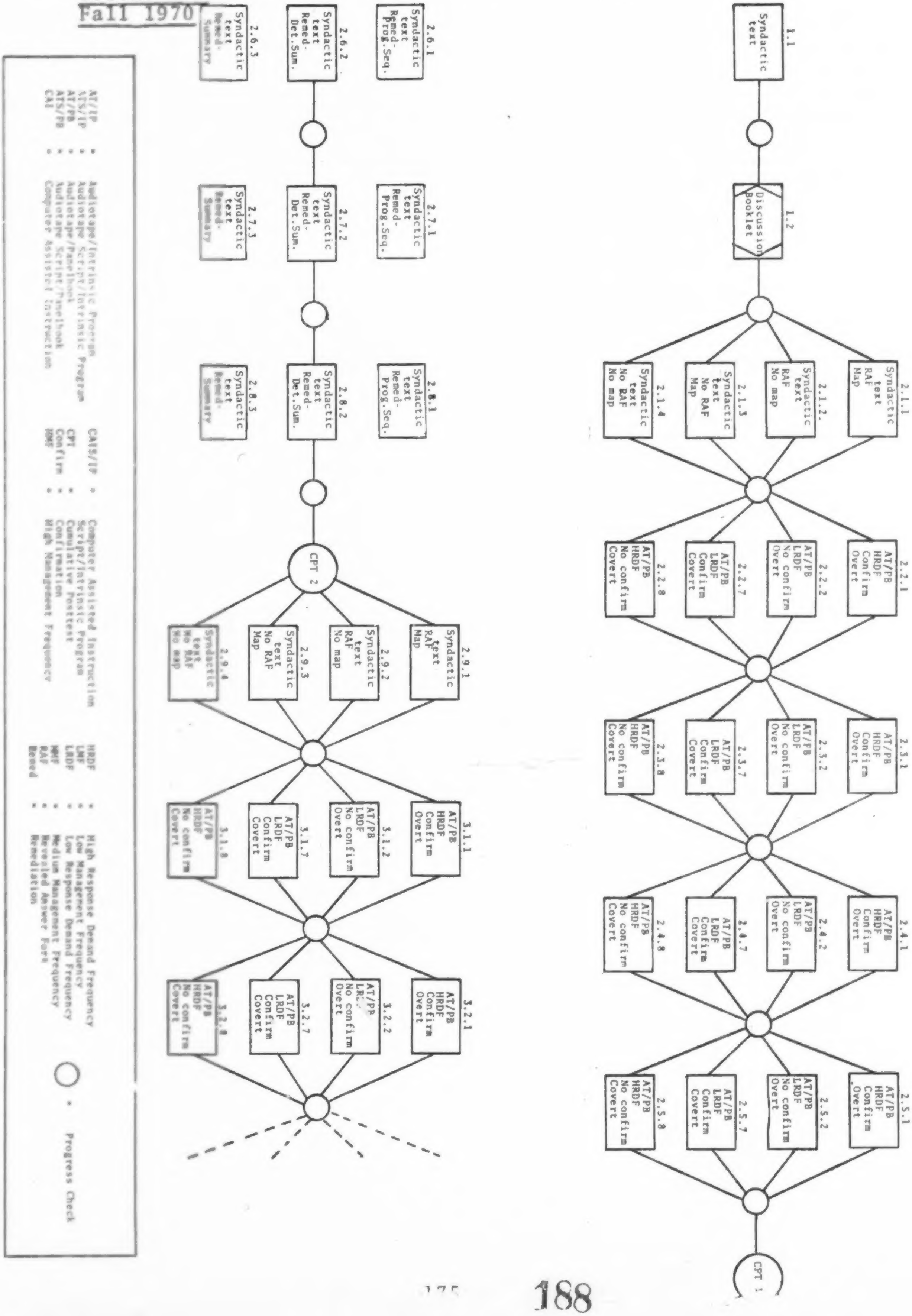

PART TWELVE
APPLIED LEADERSHIP
1
2
3
4
12.1.1 CAI HRDF HMF
12.1.2 CAI HRDF MMF
12.1.3 CAI HRDF LMF
12.1.4 CAI LRDF LMF
PC1
12.2.1 CAI HRDF HMF
12.2.2 CAI HRDF MMF
12.2.3 CAI HRDF LMF
12.2.4 CAI LRDF LMF
PC2
12.3.1 CAI HRDF HMF
12.3.2 CAI HRDF MMF
12.3.3 CAI HRDF LMF
12.3.4 CAI LRDF LMF
PC3
12.4.1 CAI HRDF HMF
12.4.2 CAI HRDF MMF
12.4.3 CAI HRDF LMF
12.4.4 CAI LRDF LMF
PC4
CPT14

than either overt spoken or covert. In regard to management frequency, there was little conclusive evidence related to the manipulation of this presentation variable. Remediation variables likewise seemed to have no effect on the student's performance. Peer interaction as still another variable, yielded little significance. There was one surprise, almost in contradiction to the Tosti-Ball concept. Differences were found in favor of audiotape over videotape lecture format.

While there was some pressure to replicate the exact experimental design in the second run [Fall 1970] to cross-validate these findings, there was sufficient evidence a this point in time to make some alterations to the desig which might move it forward to the final selection process. Figure 13,indicates the changes which were made in the experimental design which attempted to refine these selections. First, videotapes were dropped, partly because of the experimental findings, partly because revision costs approached the prohibitive level and other performance indicators suggested a cost effectiveness disadvantage, and partially because videotape equipment would not be logistically feasible for large numbers of students. Peer interaction, as a variable, was no longer under consideration, and it was replaced by an advanced organizer technique, the content map, as a variable in the instructional package

Presentation Design
Second Run
Fall 1970

FIGURE 13


1.1 Syndactic text
1.2 Discussion Booklet
2.1.1 Syndactic text RAF Map
2.1.2 Syndactic text RAF No map
2.1.3 Syndactic text No RAF Map
2.1.4 Syndactic text No RAF No map
2.2.1 AT/PB HRDF Confirm Overt
2.2.2 AT/PB LRDF No confirm Overt
2.2.7 AT/PB LRDF Confirm Covert
2.2.8 AT/PB HRDF No confirm Covert
2.3.1 AT/PB HRDF Confirm Overt
2.3.2 AT/PB LRDF No confirm Overt
2.3.7 AT/PB LRDF Confirm Covert
2.3.8 AT/PB HRDF No confirm Covert
2.4.1 AT/PB HRDF Confirm Overt
2.4.2 AT/PB LRDF No confirm Overt
2.4.7 AT/PB LRDF Confirm Covert
2.4.8 AT/PB HRDF No confirm Covert
2.5.1 AT/PB HRDF Confirm Overt
2.5.2 AT/PB LRDF No confirm Overt
2.5.7 AT/PB LRDF Confirm Covert
2.5.8 AT/PB HRDF No confirm Covert
CPT 1
2.6.1 Syndactic text Remed-Prog.Seq.
2.6.2 Syndactic text Remed-Det.Sum.
2.6.3 Syndactic text Remed-Summary
2.7.1 Syndactic text Remed-Prog.Seq.
2.7.2 Syndactic text Remed-Det.Sum.
2.7.3 Syndactic text Remed-Summary
2.8.1 Syndactic text Remed-Prog.Seq.
2.8.2 Syndactic text Remed-Det.Sum.
2.8.3 Syndactic text Remed-Summary
CPT 2
2.9.1 Syndactic text RAF Map
2.9.2 Syndactic text RAF No map
2.9.3 Syndactic text No RAF Map
2.9.4 Syndactic text No RAF No map
3.1.1 AT/PB HRDF Confirm Overt
3.1.2 AT/PB LRDF No confirm Overt
3.1.7 AT/PB LRDF Confirm Covert
3.1.8 AT/PB HRDF No confirm Covert
3.2.1 AT/PB HRDF Confirm Overt
3.2.2 AT/PB LRDF No confirm Overt
3.2.7 AT/PB LRDF Confirm Covert
3.2.8 AT/PB HRDF No confirm Covert
AT/IP = Audiotape/Intrinsic Program
ATS/IP = Audiotape Script/Intrinsic Program
AT/PB = Audiotape/Panelbook
ATS/PB = Audiotape Script/Panelbook
CAI = Computer Assisted Instruction
CAIS/IP = Computer Assisted Instruction Script/Intrinsic Program
CPT = Cumulative Posttest
Confirm = Confirmation
HMF = High Management Frequency
HRDF = High Response Demand Frequency
LMF = Low Management Frequency
LRDF = Low Response Demand Frequency
MMF = Medium Management Frequency
RAF = Revealed Answer Form
Remed = Remediation
○ = Progress Check

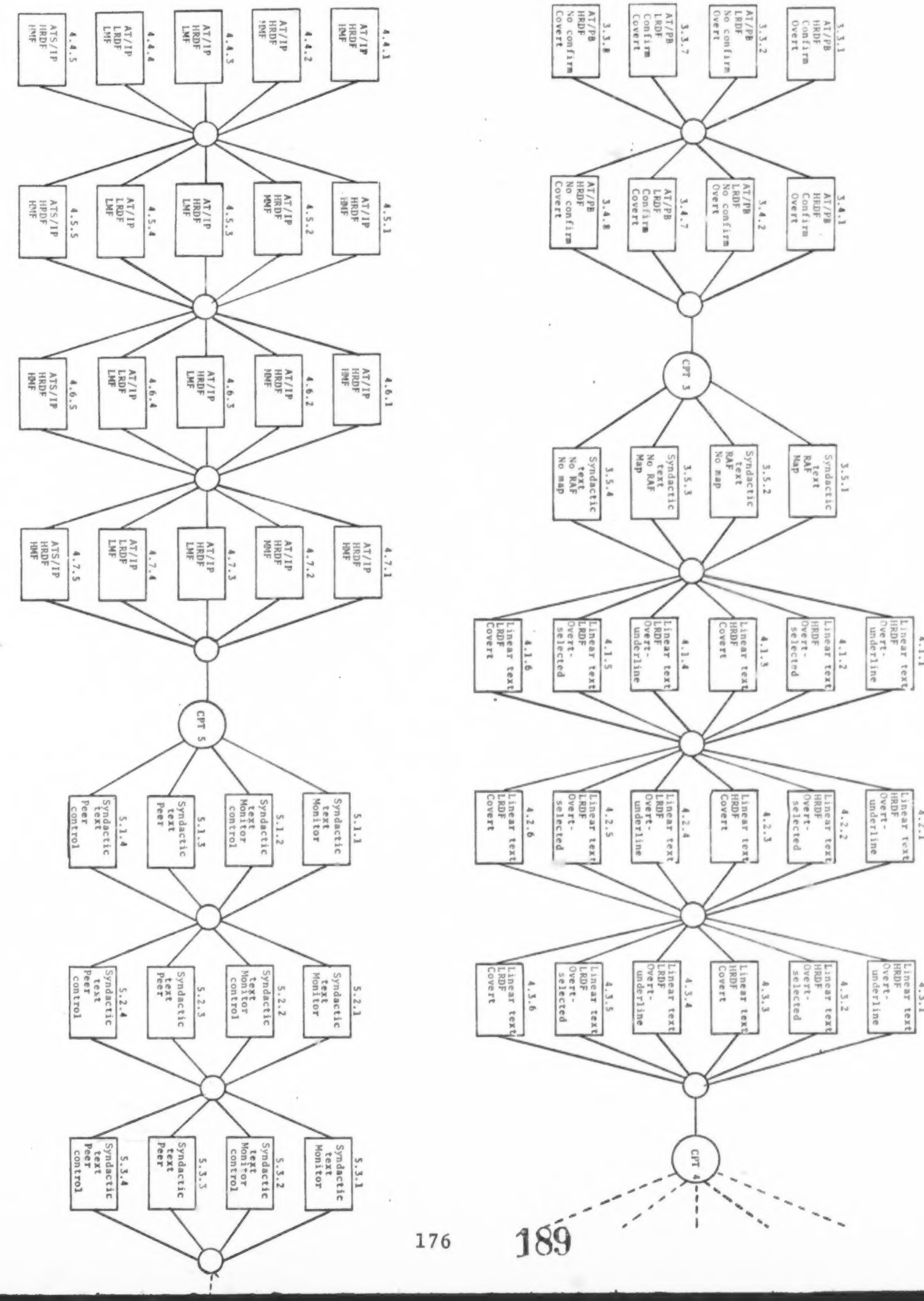
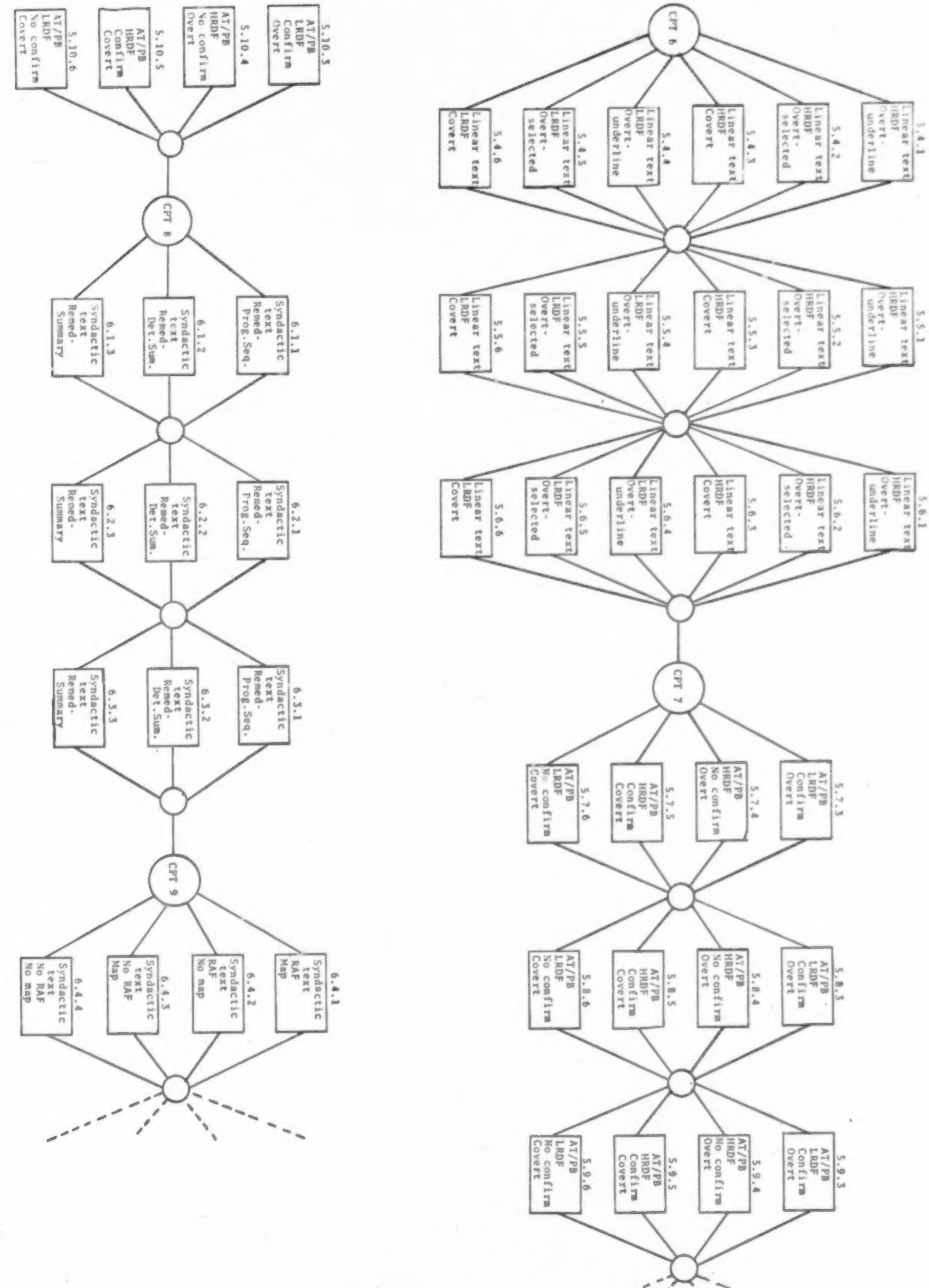
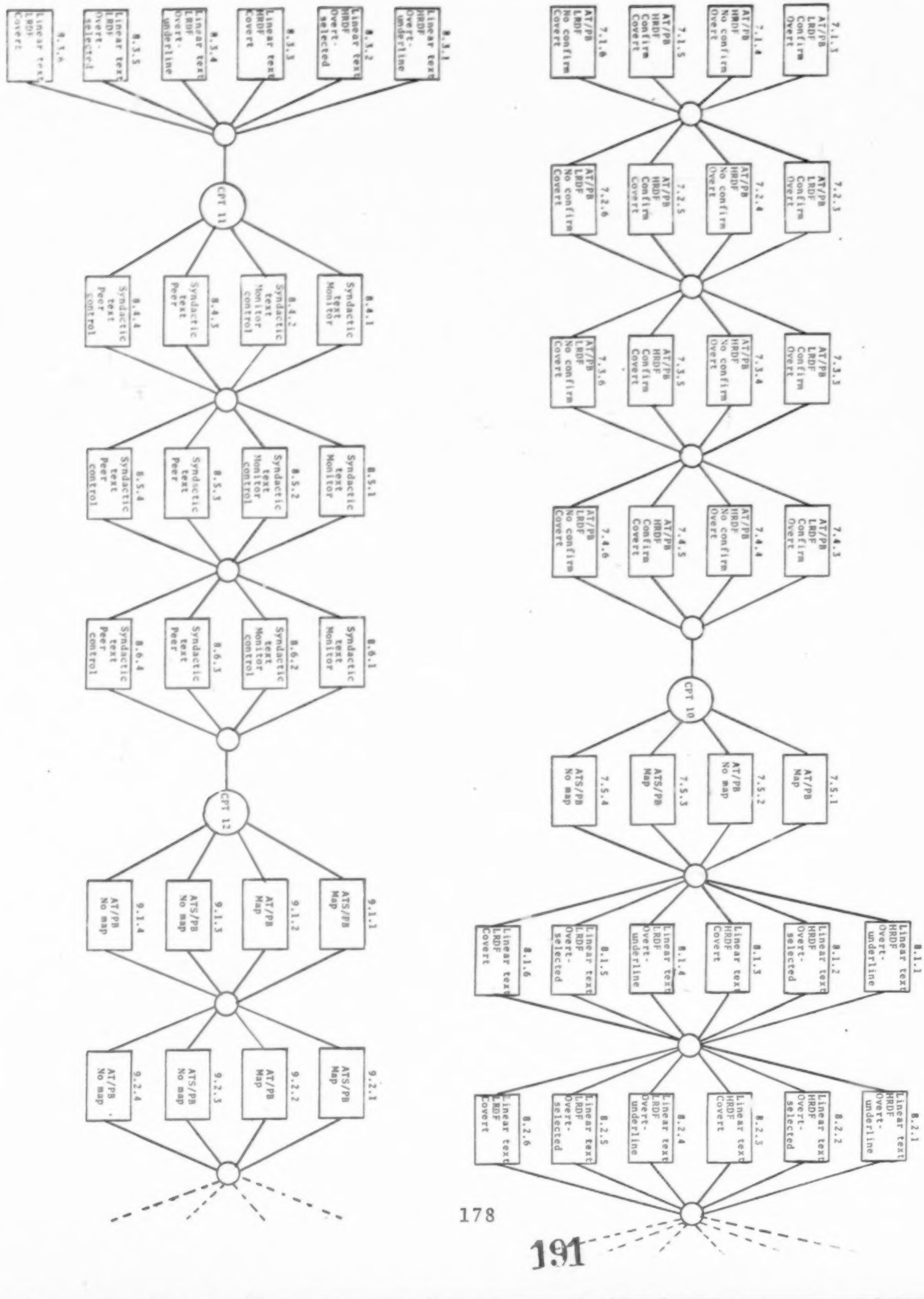

3.3.1 AT/PB HRDF Confirm Overt
3.3.2 AT/PB LRDF No confirm Overt
3.3.7 AT/PB LRDF Confirm Covert
3.3.8 AT/PB HRDF No confirm Covert
3.4.1 AT/PB HRDF Confirm Overt
3.4.2 AT/PB LRDF No confirm Overt
3.4.7 AT/PB LRDF Confirm Covert
3.4.8 AT/PB HRDF No confirm Covert
CPT 3
3.5.1 Syndactic text RAF Map
3.5.2 Syndactic text RAF No map
3.5.3 Syndactic text No RAF Map
3.5.4 Syndactic text No RAF No map
4.1.1 Linear text HRDF Overt-underline
4.1.2 Linear text HRDF Overt-selected
4.1.3 Linear text HRDF Covert
4.1.4 Linear text LRDF Overt-underline
4.1.5 Linear text LRDF Overt-selected
4.1.6 Linear text LRDF Covert
4.2.1 Linear text HRDF Overt-underline
4.2.2 Linear text HRDF Overt-selected
4.2.3 Linear text HRDF Covert
4.2.4 Linear text LRDF Overt-underline
4.2.5 Linear text LRDF Overt-selected
4.2.6 Linear text LRDF Covert
4.3.1 Linear text HRDF Overt-underline
4.3.2 Linear text HRDF Overt-selected
4.3.3 Linear text HRDF Covert
4.3.4 Linear text LRDF Overt-underline
4.3.5 Linear text LRDF Overt-selected
4.3.6 Linear text LRDF Covert
CPT 4
4.4.1 AT/IP HRDF HMF
4.4.2 AT/IP HRDF MMF
4.4.3 AT/IP HRDF LMF
4.4.4 AT/IP LRDF LMF
4.4.5 ATS/IP HRDF HMF
4.5.1 AT/IP HRDF HMF
4.5.2 AT/IP HRDF MMF
4.5.3 AT/IP HRDF LMF
4.5.4 AT/IP LRDF LMF
4.5.5 ATS/IP HRDF HMF
4.6.1 AT/IP HRDF HMF
4.6.2 AT/IP HRDF MMF
4.6.3 AT/IP HRDF LMF
4.6.4 AT/IP LRDF LMF
4.6.5 ATS/IP HRDF HMF
4.7.1 AT/IP HRDF HMF
4.7.2 AT/IP HRDF MMF
4.7.3 AT/IP HRDF LMF
4.7.4 AT/IP LRDF LMF
4.7.5 ATS/IP HRDF HMF
CPT 5
5.1.1 Syndactic text Monitor
5.1.2 Syndactic text Monitor control
5.1.3 Syndactic text Peer
5.1.4 Syndactic text Peer control
5.2.1 Syndactic text Monitor
5.2.2 Syndactic text Monitor control
5.2.3 Syndactic text Peer
5.2.4 Syndactic text Peer control
5.3.1 Syndactic text Monitor
5.3.2 Syndactic text Monitor control
5.3.3 Syndactic text Peer
5.3.4 Syndactic text Peer control

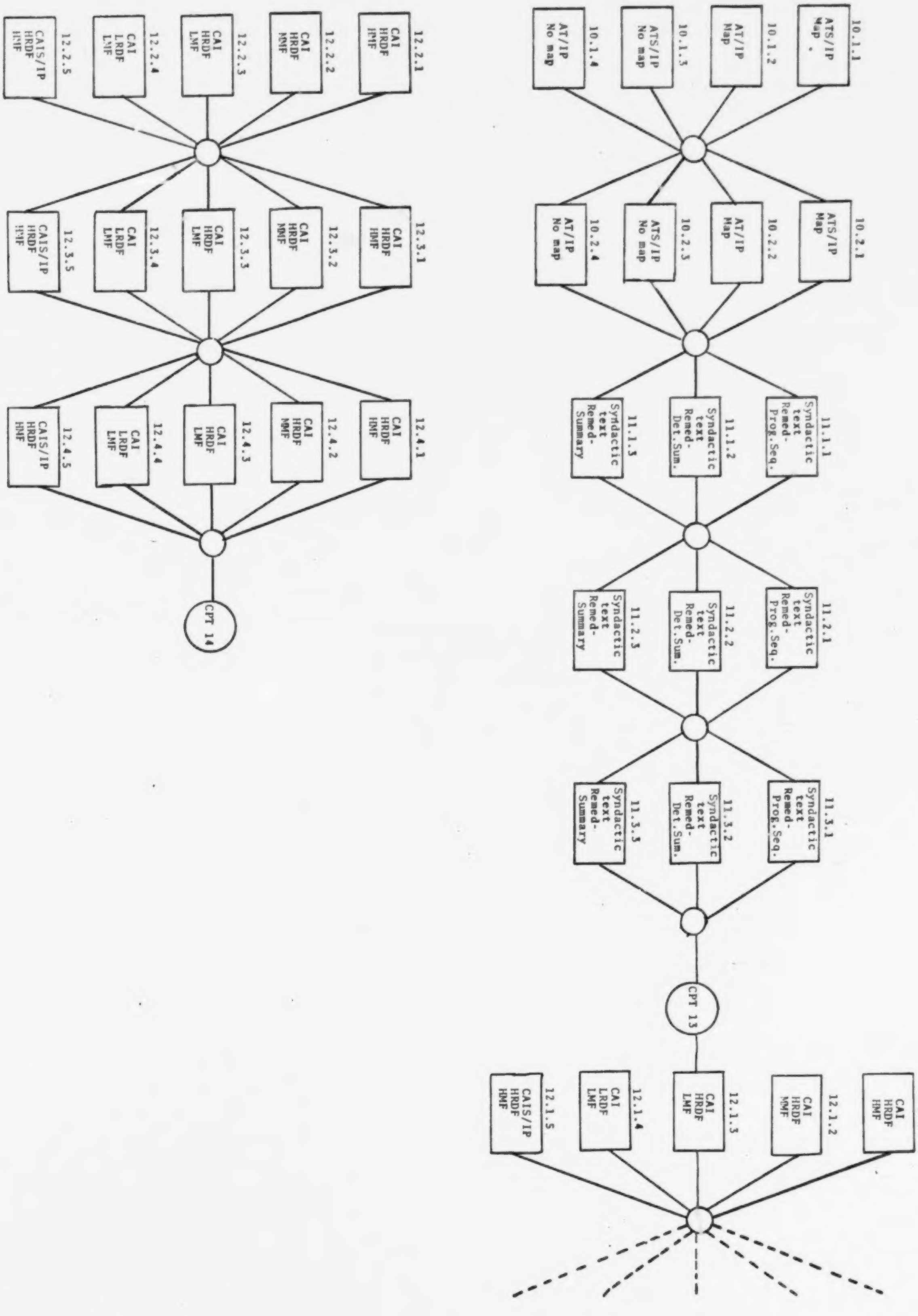
FIGURE 13 cont.



CPT 6
5.4.1 Linear text HRDF Overt-underline
5.4.2 Linear text HRDF Overt-selected
5.4.3 Linear text HRDF Covert
5.4.4 Linear text LRDF Overt-underline
5.4.5 Linear text LRDF Overt-selected
5.4.6 Linear text LRDF Covert
5.5.1 Linear text HRDF Overt-underline
5.5.2 Linear text HRDF Overt-selected
5.5.3 Linear text HRDF Covert
5.5.4 Linear text LRDF Overt-underline
5.5.5 Linear text LRDF Overt-selected
5.5.6 Linear text LRDF Covert
5.6.1 Linear text HRDF Overt-underline
5.6.2 Linear text HRDF Overt-selected
5.6.3 Linear text HRDF Covert
5.6.4 Linear text LRDF Overt-underline
5.6.5 Linear text LRDF Overt-selected
5.6.6 Linear text LRDF Covert
CPT 7
5.7.3 AT/PB LRDF Confirm Overt
5.7.4 AT/PB HRDF No confirm Overt
5.7.5 AT/PB HRDF Confirm Covert
5.7.6 AT/PB LRDF No confirm Covert
5.8.3 AT/PB LRDF Confirm Overt
5.8.4 AT/PB HRDF No confirm Overt
5.8.5 AT/PB HRDF Confirm Covert
5.8.6 AT/PB LRDF No confirm Covert
5.9.3 AT/PB LRDF Confirm Overt
5.9.4 AT/PB HRDF No confirm Overt
5.9.5 AT/PB HRDF Confirm Covert
5.9.6 AT/PB LRDF No confirm Covert
5.10.3 AT/PB LRDF Confirm Overt
5.10.4 AT/PB HRDF No confirm Overt
5.10.5 AT/PB HRDF Confirm Covert
5.10.6 AT/PB LRDF No confirm Covert
CPT 8
6.1.1 Syndactic text Remed-Prog.Seq.
6.1.2 Syndactic text Remed-Det.Sum.
6.1.3 Syndactic text Remed-Summary
6.2.1 Syndactic text Remed-Prog.Seq.
6.2.2 Syndactic text Remed-Det.Sum.
6.2.3 Syndactic text Remed-Summary
6.3.1 Syndactic text Remed-Prog.Seq.
6.3.2 Syndactic text Remed-Det.Sum.
6.3.3 Syndactic text Remed-Summary
CPT 9
6.4.1 Syndactic text RAF Map
6.4.2 Syndactic text RAF No map
6.4.3 Syndactic text No RAF Map
6.4.4 Syndactic text No RAF No map

FIGURE 13 cont.


7.1.3
AT/PB LRDF Confirm Overt
7.1.4
AT/PB HRDF No confirm Overt
7.1.5
AT/PB HRDF Confirm Covert
7.1.6
AT/PB LRDF No confirm Covert
7.2.3
AT/PB LRDF Confirm Overt
7.2.4
AT/PB HRDF No confirm Overt
7.2.5
AT/PB HRDF Confirm Covert
7.2.6
AT/PB LRDF No confirm Covert
7.3.3
AT/PB LRDF Confirm Overt
7.3.4
AT/PB HRDF No confirm Overt
7.3.5
AT/PB HRDF Confirm Covert
7.3.6
AT/PB LRDF No confirm Covert
7.4.3
AT/PB LRDF Confirm Overt
7.4.4
AT/PB HRDF No confirm Overt
7.4.5
AT/PB HRDF Confirm Covert
7.4.6
AT/PB LRDF No confirm Covert
CPT 10
7.5.1
AT/PB Map
7.5.2
AT/PB No map
7.5.3
ATS/PB Map
7.5.4
ATS/PB No map
8.1.1
Linear text HRDF Overt-underline
8.1.2
Linear text HRDF Overt-selected
8.1.3
Linear text HRDF Covert
8.1.4
Linear text LRDF Overt-underline
8.1.5
Linear text LRDF Overt-selected
8.1.6
Linear text LRDF Covert
8.2.1
Linear text HRDF Overt-underline
8.2.2
Linear text HRDF Overt-selected
8.2.3
Linear text HRDF Covert
8.2.4
Linear text LRDF Overt-underline
8.2.5
Linear text LRDF Overt-selected
8.2.6
Linear text LRDF Covert
8.3.1
Linear text HRDF Overt-underline
8.3.2
Linear text HRDF Overt-selected
8.3.3
Linear text HRDF Covert
8.3.4
Linear text LRDF Overt-underline
8.3.5
Linear text LRDF Overt-selected
8.3.6
Linear text LRDF Covert
CPT 11
8.4.1
Syndactic text Monitor
8.4.2
Syndactic text Monitor control
8.4.3
Syndactic text Peer
8.4.4
Syndactic text Peer control
8.5.1
Syndactic text Monitor
8.5.2
Syndactic text Monitor control
8.5.3
Syndactic text Peer
8.5.4
Syndactic text Peer control
8.6.1
Syndactic text Monitor
8.6.2
Syndactic text Monitor control
8.6.3
Syndactic text Peer
8.6.4
Syndactic text Peer control
CPT 12
9.1.1
ATS/PB Map
9.1.2
AT/PB Map
9.1.3
ATS/PB No map
9.1.4
AT/PB No map
9.2.1
ATS/PB Map
9.2.2
AT/PB Map
9.2.3
ATS/PB No map
9.2.4
AT/PB No map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10.2.2
AT/IP Map
10.2.3
ATS/IP No map
10.2.4
AT/IP No map
11.1.1
Syndactic text Remed- Prog.Seq.
11.1.2
Syndactic text Remed. Det.Sum.
11.1.3
Syndactic text Remed- Summary
11.2.1
Syndactic text Remed- Prog.Seq.
11.2.2
Syndactic text Remed. Det.Sum.
11.2.3
Syndactic text Remed- Summary
11.3.1
Syndactic text Remed- Prog.Seq.
11.3.2
Syndactic text Remed- Det.Sum.
11.3.3
Syndactic text Remed- Summary
CPT 13
12.1.1
CAI HRDF HMF
12.1.2
CAI HRDF MMF
12.1.3
CAI HRDF LMF
12.1.4
CAI LRDF LMF
12.1.5
CAIS/IP HRDF HMF
12.2.1
CAI HRDF HMF
12.2.2
CAI HRDF MMF
12.2.3
CAI HRDF LMF
12.2.4
CAI LRDF LMF
12.2.5
CAIS/IP HRDF HMF
12.3.1
CAI HRDF HMF
12.3.2
CAI HRDF MMF
12.3.3
CAI HRDF LMF
12.3.4
CAI LRDF LMF
12.3.5
CAIS/IP HRDF HMF
12.4.1
CAI HRDF HMF
12.4.2
CAI HRDF MMF
12.4.3
CAI HRDF LMF
12.4.4
CAI LRDF LMF
12.4.5
CAIS/IP HRDF HMF
CPT 14

which might facilitate a learning process. To further examine the desirability of media dependent presentations, printed versions of the CAI sections and selected audiotape scripts were prepared for comparison against the standard presentations.

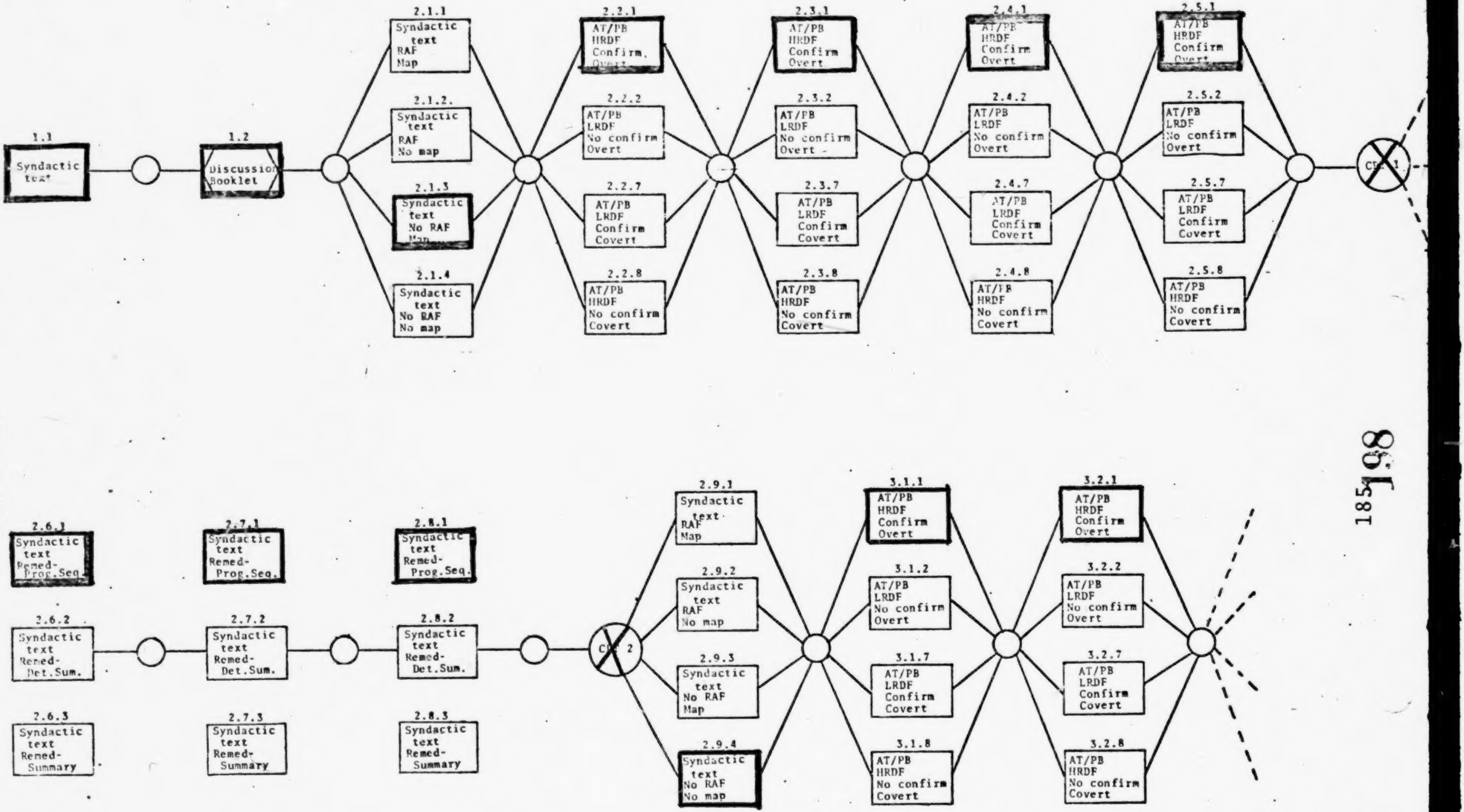
Results of Second Iteration and Final Selection

Once again the overriding conclusion from the fall run came from data which did not support the Tosti-Ball theory on the importance of presentation design characteristics. However, the researchers were very careful to note that this was the first experimental effort examining their basic thesis and carefully avoided generalizations which may not hold true for other populations and experimental conditions. The lack of significant differences, it should be noted, should in no way be equated to failure. It is a benefit to education to find that sophisticated hardware presentations are no more effective than less expensive paper formats properly constructed. And, if this series of studies tends to retire from further consideration the importance of presentation variables,it tends to free the way for further study of previously little noted variables in instructional development. The course was phenomenally successful and some would suggest that the failure to find major differences in the presentation variable was the direct result of the fact that almost all the materials were successful in meeting criterion performance.

These points, however, did not diminish the ongoing responsibility of refining the media and presentation selection process to derive the final course system. At the time that the fall research run data was beginning to indicate a confirmation of many previously established differences or no differences, work began on preparing the final course product and system.

Perhaps the major decision relative to media selection for the final course system was the specification of a printed format as an alternate to the audiotape presentations. The form selected was the syndactic text which had proved both successful and popular and which lent itself more readily to the concept of individualization. The second decision pertained to the specification of those final modules which would represent the main line of instruction in the final course system. Despite the fact that the overall concept of the Tosti-Ball thesis on presentation variables did not prove valid for this project, a combination of presentation variables exhibited a trend which justified their inclusion in the final module selection for the course system. High response demand frequency [i.e. a question every frame] with overt selected response [i.e. the student physically identifies the right answer by writing it or circling from appropriate choices] with medium management frequency were the three variables that were incorporated into the final modules for each segment. Figure 14 indicates the modules which were selected for the final course systems design. Where these modules did not conform to high response demand frequency, overt selected response, and medium management frequency, adjustments were made accordingly. This table is identical to Figure 13 which depicted the media and presentation variable options for the fall '70 run of the course.

Presentation Design-Final (Third) Run-Spring 1971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Syndactic text
1.2
Discussion Booklet
2.1.1
Syndactic text RAF Map
2.1.2.
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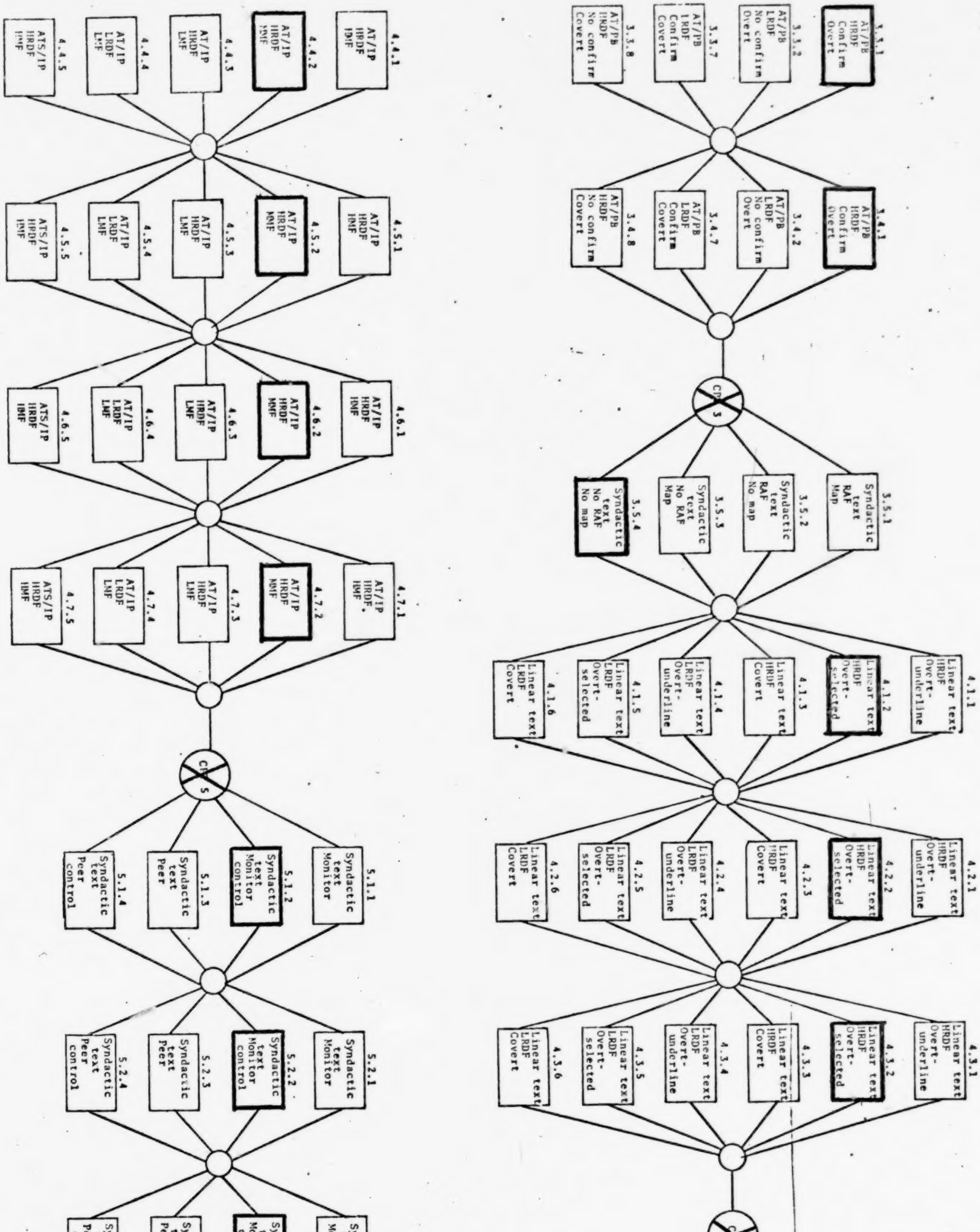
2.1.3
Syndactic text No RAF Map
2.1.4
Syndactic text No RAF No map
2.2.1
AT/PB HRDF Confirm. Overt
2.2.2
AT/PB LRDF No confirm Overt
2.2.7
AT/PB LRDF Confirm Covert
2.2.8
AT/PB HRDF No confirm Covert
2.3.1
AT/PB HRDF Confirm Overt
2.3.2
AT/PB LRDF No confirm Overt
2.3.7
AT/PB LRDF Confirm Covert
2.3.8
AT/PB HRDF No confirm Covert
2.4.1
AT/PB HRDF Confirm Overt
2.4.2
AT/PB LRDF No confirm Overt
2.4.7
AT/PB LRDF Confirm Covert
2.4.8
AT/PB HRDF No confirm Covert
2.5.1
AT/PB HRDF Confirm Overt
2.5.2
AT/PB LRDF No confirm Overt
2.5.7
AT/PB LRDF Confirm Covert
2.5.8
AT/PB HRDF No confirm Covert
CP 1
2.6.1
Syndactic text Remed-Prog.Seq.
2.6.2
Syndactic text Remed-Det.Sum.
2.6.3
Syndactic text Remed-Summary
2.7.1
Syndactic text Remed-Prog.Seq.
2.7.2
Syndactic text Remed-Det.Sum.
2.7.3
Syndactic text Remed-Summary
2.8.1
Syndactic text Remed-Prog.Seq.
2.8.2
Syndactic text Remed-Det.Sum.
2.8.3
Syndactic text Remed-Summary
CP 2
2.9.1
Syndactic text RAF Map
2.9.2
Syndactic text RAF No map
2.9.3
Syndactic text No RAF Map
2.9.4
Syndactic text No RAF No map
3.1.1
AT/PB HRDF Confirm Overt
3.1.2
AT/PB LRDF No confirm Overt
3.1.7
AT/PB LRDF Confirm Covert
3.1.8
AT/PB HRDF No confirm Covert
3.2.1
AT/PB HRDF Confirm Overt
3.2.2
AT/PB LRDF No confirm Overt
3.2.7
AT/PB LRDF Confirm Covert
3.2.8
AT/PB HRDF No confirm Covert

AT/IP = Audiotape/Intrinsic Program
ATS/IP = Audiotape Script/Intrinsic Program
AT/PB = Audiotape/Panelbook
ATS/PB = Audiotape Script/Panelbook
CAI = Computer Assisted Instruction

CAIS/IP = Computer Assisted Instruction Script/Intrinsic Program
CPT = Cumulative Posttest
Confirm = Confirmation
HMF = High Management Frequency

HRDF = High Response Demand Frequency
LMF = Low Management Frequency
LRDF = Low Response Demand Frequency
MMF = Medium Management Frequency
RAF = Revealed Answer Form
Remed = Remediation

○ = Progress Check

3.3.1
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3.3.7
AT/PB LRDF Confirm Covert
3.3.8
AT/PB HRDF No confirm Covert
3.4.1
AT/PB HRDF Confirm Overt
3.4.2
AT/PB LRDF No confirm Overt
3.4.7
AT/PB LRDF Confirm Covert
3.4.8
AT/PB HRDF No confirm Covert
CP 3
3.5.1
Syndactic text RAF Map
3.5.2
Syndactic text RAF No map
3.5.3
Syndactic text No RAF Map
3.5.4
Syndactic text No RAF No map
4.1.1
Linear text HRDF Overt-underline
4.1.2
Linear text HRDF Overt-selected
4.1.3
Linear text HRDF Covert
4.1.4
Linear text LRDF Overt-underline
4.1.5
Linear text LRDF Overt-selected
4.1.6
Linear text LRDF Covert
4.2.1
Linear text HRDF Overt-underline
4.2.2
Linear text HRDF Overt-selected
4.2.3
Linear text HRDF Covert
4.2.4
Linear text LRDF Overt-underline
4.2.5
Linear text LRDF Overt-selected
4.2.6
Linear text LRDF Covert
4.3.1
Linear text HRDF Overt-underline
4.3.2
Linear text HRDF Overt-selected
4.3.3
Linear text HRDF Covert
4.3.4
Linear text LRDF Overt-underline
4.3.5
Linear text LRDF Overt-selected
4.3.6
Linear text LRDF Covert
CP 4
4.4.1
AT/IP HRDF HMF
4.4.2
AT/IP HRDF MMF
4.4.3
AT/IP HRDF LMF
4.4.4
AT/IP LRDF LMF
4.4.5
ATS/IP HRDF HMF
4.5.1
AT/IP HRDF HMF
4.5.2
AT/IP HRDF MMF
4.5.3
AT/IP HRDF LMF
4.5.4
AT/IP LRDF LMF
4.5.5
ATS/IP HRDF HMF
4.6.1
AT/IP HRDF HMF
4.6.2
AT/IP HRDF MMF
4.6.3
AT/IP HRDF LMF
4.6.4
AT/IP LRDF LMF
4.6.5
ATS/IP HRDF HMF
4.7.1
AT/IP HRDF HMF
4.7.2
AT/IP HRDF MMF
4.7.3
AT/IP HRDF LMF
4.7.4
AT/IP LRDF LMF
4.7.5
ATS/IP HRDF HMF
CP 5
5.1.1
Syndactic text Monitor
5.1.2
Syndactic text Monitor control
5.1.3
Syndactic text Peer
5.1.4
Syndactic text Peer control
5.2.1
Syndactic text Monitor
5.2.2
Syndactic text Monitor control
5.2.3
Syndactic text Peer
5.2.4
Syndactic text Peer control
5.3.1
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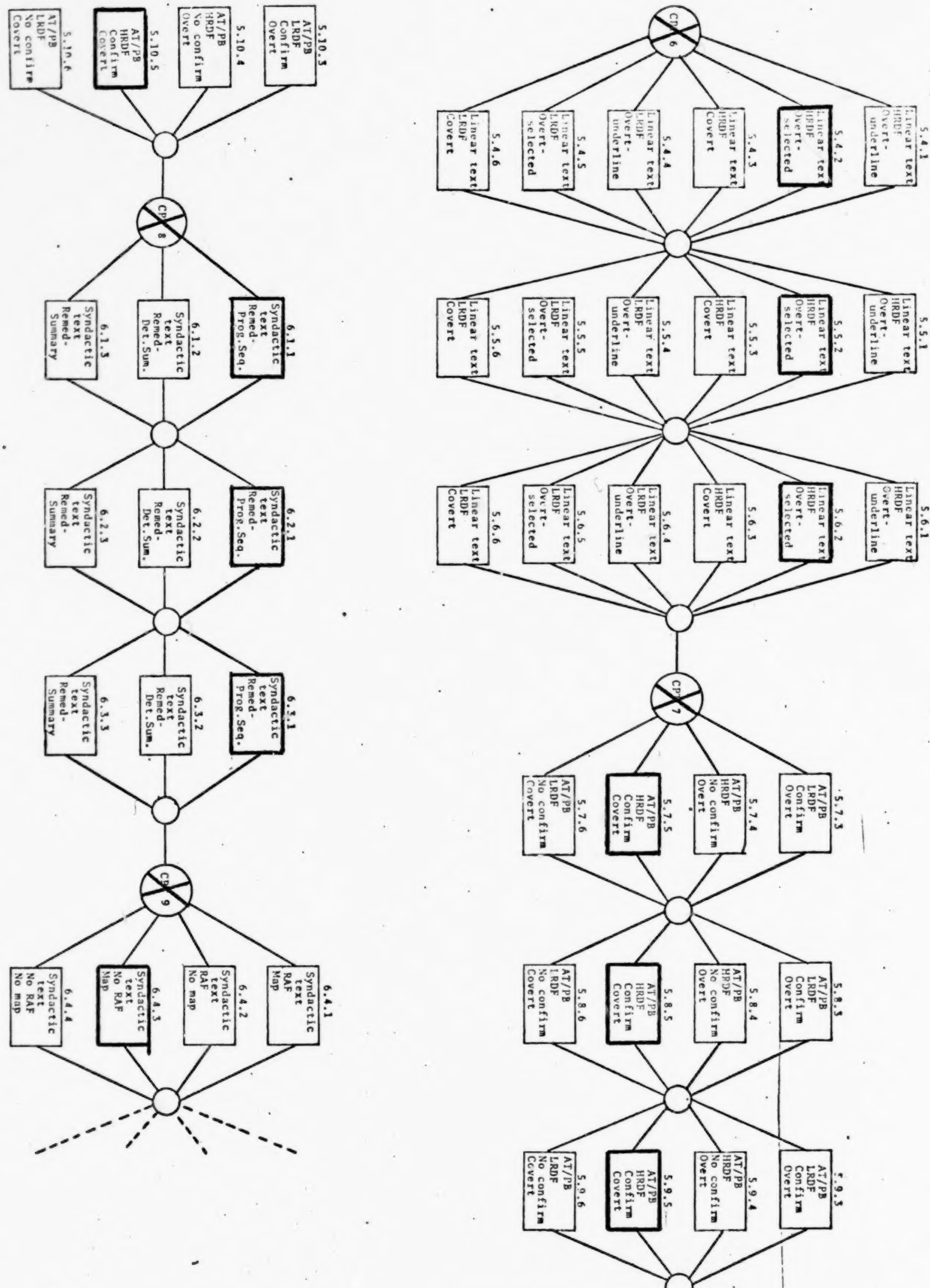
5.3.2
Syndactic text Monitor control
5.3.3
Syndactic text Peer
5.3.4
Syndactic text Peer control



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Linear text
HRDF
Overt-
underline
5.4.2
Linear text
HRDF
Overt-
selected
5.4.3
Linear text
HRDF
Covert
5.4.4
Linear text
LRDF
Overt-
underline
5.4.5
Linear text
LRDF
Overt-
selected
5.4.6
Linear text
LRDF
Covert
5.5.1
Linear text
HRDF
Overt-
underline
5.5.2
Linear text
HRDF
Overt-
selected
5.5.3
Linear text
HRDF
Covert
5.5.4
Linear text
LRDF
Overt-
underline
5.5.5
Linear text
LRDF
Overt-
selected
5.5.6
Linear text
LRDF
Covert
5.6.1
Linear text
HRDF
Overt-
underline
5.6.2
Linear text
HRDF
Overt-
selected
5.6.3
Linear text
HRDF
Covert
5.6.4
Linear text
LRDF
Overt-
underline
5.6.5
Linear text
LRDF
Overt-
selected
5.6.6
Linear text
LRDF
Covert
CP 7
5.7.3
AT/PB
LRDF
Confirm
Overt
5.7.4
AT/PB
HRDF
No confirm
Overt
5.7.5
AT/PB
HRDF
Confirm
Covert
5.7.6
AT/PB
LRDF
No confirm
Covert
5.8.3
AT/PB
LRDF
Confirm
Overt
5.8.4
AT/PB
HRDF
No confirm
Overt
5.8.5
AT/PB
HRDF
Confirm
Covert
5.8.6
AT/PB
LRDF
No confirm
Covert
5.9.3
AT/PB
LRDF
Confirm
Overt
5.9.4
AT/PB
HRDF
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Overt
5.9.5
AT/PB
HRDF
Confirm
Covert
5.9.6
AT/PB
LRDF
No confirm
Covert
5.10.3
AT/PB
LRDF
Confirm
Overt
5.10.4
AT/PB
HRDF
No confirm
Overt
5.10.5
AT/PB
HRDF
Confirm
Covert
5.10.6
AT/PB
LRDF
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Covert
CP 8
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Syndactic
text
Remed-
Prog.Seq.
6.1.2
Syndactic
text
Remed-
Det.Sum.
6.1.3
Syndactic
text
Remed-
Summary
6.2.1
Syndactic
text
Remed-
Prog.Seq.
6.2.2
Syndactic
text
Remed-
Det.Sum.
6.2.3
Syndactic
text
Remed-
Summary
6.3.1
Syndactic
text
Remed-
Prog.Seq.
6.3.2
Syndactic
text
Remed-
Det.Sum.
6.3.3
Syndactic
text
Remed-
Summary
CP 9
6.4.1
Syndactic
text
RAF
Map
6.4.2
Syndactic
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Map
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Syndactic
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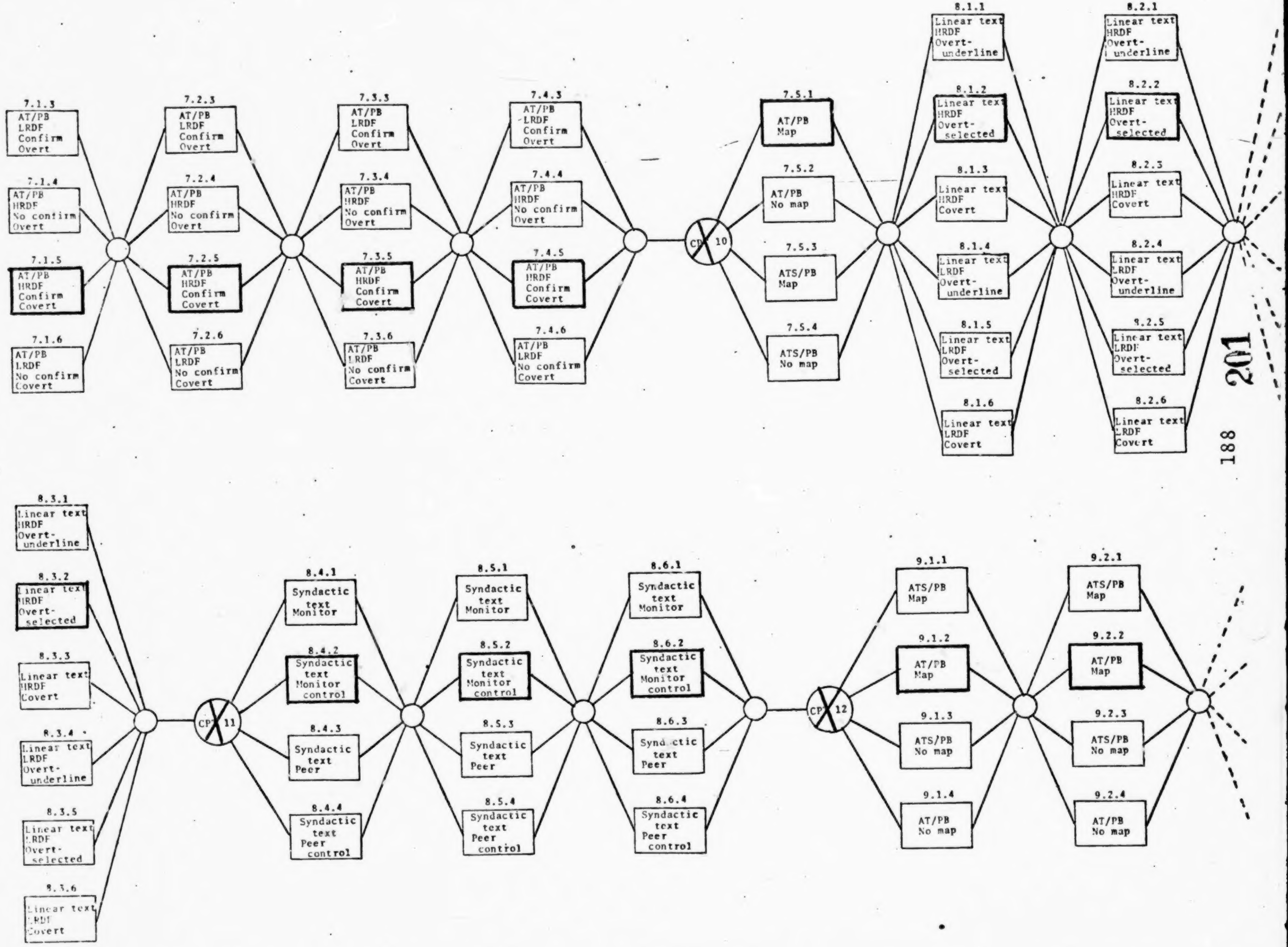
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7.2.6
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7.3.3
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CP 10
7.5.1
AT/PB Map
7.5.2
AT/PB No map
7.5.3
ATS/PB Map
7.5.4
ATS/PB No map
8.1.1
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8.1.2
Linear text HRDF Overt-selected
8.1.3
Linear text HRDF Covert
8.1.4
Linear text LRDF Overt-underline
8.1.5
Linear text LRDF Overt-selected
8.1.6
Linear text LRDF Covert
8.2.1
Linear text HRDF Overt-underline
8.2.2
Linear text HRDF Overt-selected
8.2.3
Linear text HRDF Covert
8.2.4
Linear text LRDF Overt-underline
8.2.5
Linear text LRDF Overt-selected
8.2.6
Linear text LRDF Covert
8.3.1
Linear text HRDF Overt-underline
8.3.2
Linear text HRDF Overt-selected
8.3.3
Linear text HRDF Covert
8.3.4
Linear text LRDF Overt-underline
8.3.5
Linear text LRDF Overt-selected
8.3.6
Linear text LRDF Covert
CP 11
8.4.1
Syndactic text Monitor
8.4.2
Syndactic text Monitor control
8.4.3
Syndactic text Peer
8.4.4
Syndactic text Peer control
8.5.1
Syndactic text Monitor
8.5.2
Syndactic text Monitor control
8.5.3
Syndactic text Peer
8.5.4
Syndactic text Peer control
8.6.1
Syndactic text Monitor
8.6.2
Syndactic text Monitor control
8.6.3
Syndactic text Peer
8.6.4
Syndactic text Peer control
CP 12
9.1.1
ATS/PB Map
9.1.2
AT/PB Map
9.1.3
ATS/PB No map
9.1.4
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ATS/PB Map
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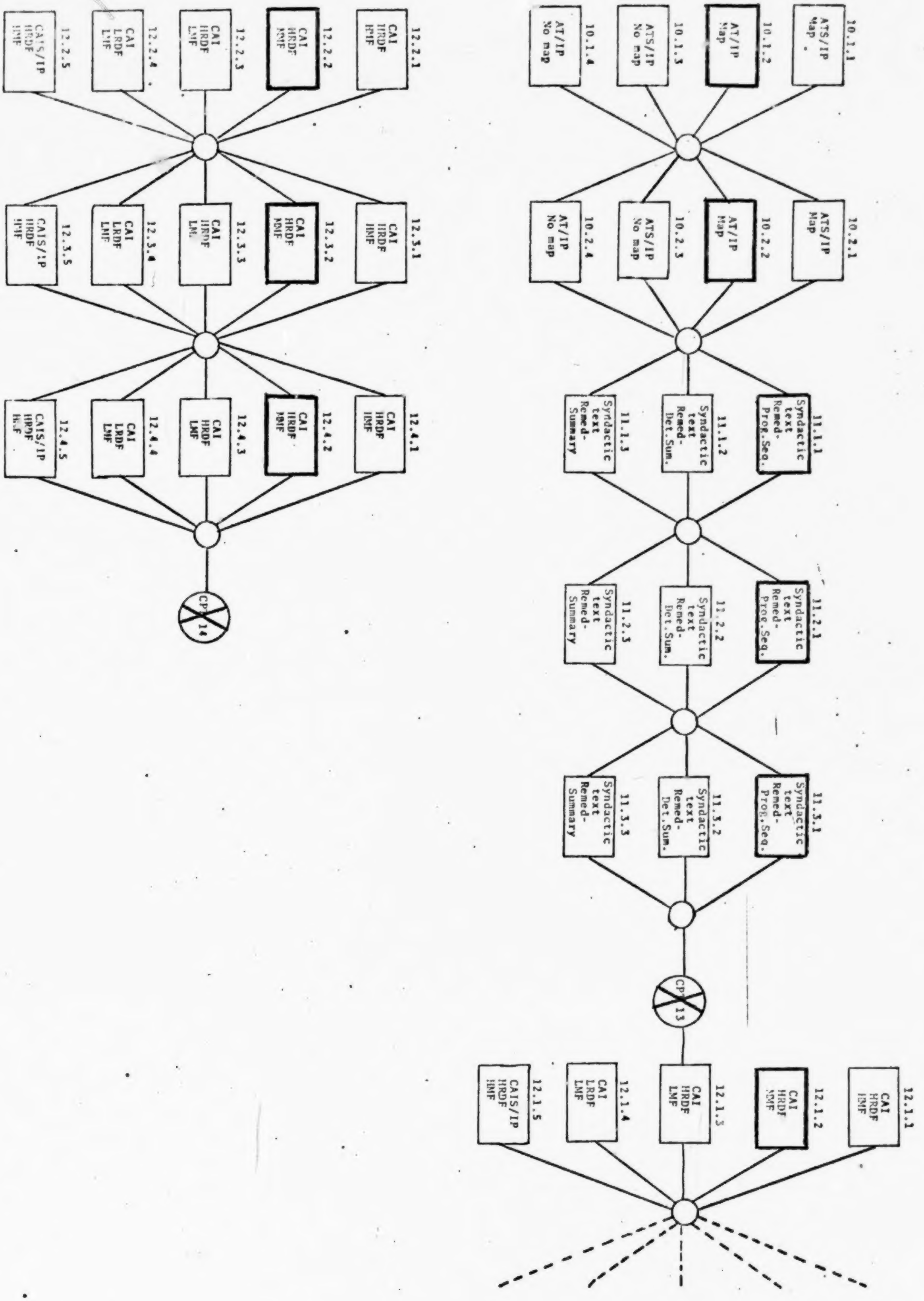
AT/PB No map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11.1.2 Syndactic text Remed- Det.Sum.
11.1.3 Syndactic text Remed- Summary
11.2.1 Syndactic text Remed- Prog.Seq.
11.2.2 Syndactic text Remed- Det.Sum.
11.2.3 Syndactic text Remed- Summary
11.3.1 Syndactic text Remed- Prog.Seq.
11.3.2 Syndactic text Remed- Det.Sum.
11.3.3 Syndactic text Remed- Summary
CP 13
12.1.1 CAI HRDF HMF
12.1.2 CAI HRDF HMF
12.1.3 CAI HRDF LMF
12.1.4 CAI LRDF LMF
12.1.5 CAIS/IP HRDF HMF
12.2.1 CAI HRDF HMF
12.2.2 CAI HRDF HMF
12.2.3 CAI HRDF LMF
12.2.4 CAI LRDF LMF
12.2.5 CAIS/IP HRDF HMF
12.3.1 CAI HRDF HMF
12.3.2 CAI HRDF HMF
12.3.3 CAI HRDF LMF
12.3.4 CAI LRDF LMF
12.3.5 CAIS/IP HRDF HMF
12.4.1 CAI HRDF HMF
12.4.2 CAI HRDF HMF
12.4.3 CAI HRDF LMF
12.4.4 CAI LRDF LMF
12.4.5 CAIS/IP HRDF HMF
CP 14

Final Course Content

The course is composed of 12 parts comprising 59 segments. The titles of the parts and segments are listed in Table 7.

Part 1 of the course, Overview of Leadership, briefly presents theoretical bases of leadership, and evolves therefrom a view of leadership as a dynamic interaction process involving a leader, his followers and an environmental situation. Part 1 further delineates the use of the basic principles of psychology and management as components of naval leadership. Acceptance of a traditional deep sense of moral responsibility as an essential trait of a naval leader is stressed here and intermittently throughout the course.

The naval leader will most often be dealing with groups of individuals, his subordinates or followers, so he should be aware of the effect of an individual's membership in a group. A fundamental knowledge of individual psychology and group dynamics is provided in Part 2, Individual Behavior, and Part 3, Group Dynamics.

No leader, regardless of his intelligence, or the originality or brilliance of his ideas, can be successful until he can communicate those ideas and directions effectively. Part 4, Achieving Effective Communication, is designed to impart to the midshipman a knowledge of the principles of communication so that he will be effective in his role as a leader.

TABLE 7

COURSE CONTENT

PART ONE: Overview of Leadership

Segment I:	Concept of Leadership
Segment II:	Standards of Leadership in the Naval Service

PART TWO: Individual Behavior

Segment I:	Introduction to Psychology
Segment II:	Behavior and Its Observation
Segment III:	Learning
Segment IV:	Factors Affecting Learning
Segment V:	Attention and Perception
Segment VI:	Motivation
Segment VII:	Conflict
Segment VIII:	Abnormal Behavior
Segment IX:	Personality

PART THREE: Group Dynamics

Segment I:	Characteristics of Groups
Segment II:	The Relation of the Leader to the Group
Segment III:	Group Interactions
Segment IV:	Conformity as a Factor of Group Behavior
Segment V:	Relation of the Individual to the Group

PART FOUR: Achieving Effective Communication

Segment I:	Importance of Interpersonal Communication
Segment II:	Types of Communication
Segment III:	The Communication Process (Receiver and Barriers)
Segment IV:	The Communication Process (Sender and Feedback)
Segment V:	Formal Communication and Its Dimensions
Segment VI:	Informal Communication
Segment VII:	Communication Under Battle Situations

PART FIVE: Military Management

Segment I:	Introduction to Management and the Management Process
Segment II:	Decision Making and Creativity
Segment III:	Objectives
Segment IV:	Planning
Segment V:	Organizing: Principles and Process
Segment VI:	Organizing: Structure
Segment VII:	Organizing: Charting
Segment VIII:	Directing
Segment IX:	Controlling
Segment X:	Coordinating

TABLE 7 Continued

PART SIX: Authority and Responsibility	
Segment 1:	Concept of Authority
Segment 11:	Why People Accept/Resist Authority
Segment 111:	Delegation of Authority; Line-Staff Relationship
Segment 1V:	Responsibility

PART SEVEN: Leadership Behavior and Style	
Segment 1:	Leadership Behavior
Segment 11:	Leadership Style
Segment 111:	Determiners of Leadership Style - The Leader
Segment 1V:	Determiners of Leadership Style - The Group and The Situation
Segment V:	Participative Leadership

PART EIGHT: Senior-Subordinate Relationships	
Segment 1:	Organizational Structure & Social Distance in Senior-Subordinate Relationships
Segment 11:	Officer-Enlisted Relationships
Segment 111:	Assumption of Command and Formal & Informal Leader Relationships
Segment 1V:	Introduction to Counseling
Segment V:	The Counseling Process
Segment V1:	Relations with Seniors and Contemporaries

PART NINE: Morale - Esprit de Corps	
Segment 1:	Morale
Segment 11:	Group Solidarity and Esprit

PART TEN: Discipline	
Segment 1:	Introduction to Discipline
Segment 11:	Development and Maintenance of Discipline

PART ELEVEN: Personnel Evaluation	
Segment 1:	The Role of Evaluation
Segment 11:	Enlisted Performance Evaluation
Segment 111:	Officer Evaluation

PART TWELVE: Applied Leadership	
Segment 1:	Measurement of Effective Leadership
Segment 11:	Generally Recognized Characteristics of an Effective Leader
Segment 111:	Techniques of Assuming Command
Segment 1V:	"That's an Order!"

A naval leader will, in his daily routine, be working with men, money, material and time. The effective use of resources available to him can best be achieved by the leader who can apply the Management Process. Part 5, Military Management, provides the midshipman with the fundamentals of the Management Process.

The latter parts of the course concentrate more specifically on those aspects of leadership which are peculiar to the military.

The naval leader, as an appointed leader, has an official authority foundation in his commission or appointment. Moral responsibility for mission accomplishment, subordinates' welfare and general efficiency is perhaps more intimately related to the military leader than to leaders in other areas of endeavor. The general theories of authority, the responsibility coincident with authority, and proper delegation of authority are treated in Part 6, Authority and Responsibility.

A leader's behavior and style are variables in any leadership situation. The spectrum of leader behavior, the variety of styles, and the causes/effects of the variations are explained in Part 7, Leadership Behavior and Style. From such knowledge, the midshipman can formulate a personal concept of possible behavior and style for himself.

The effectiveness of a leader and the influence he can exert on his followers depend to a large extent on the relationship he establishes with the subordinates. Building on the foundation acquired in Parts 2 and 3, Part 8, Senior-Subordinate Relations, delineates specific guidelines for the leader in his relationship with his subordinates. The counselor role of a leader, among his many responsibilities for the welfare of his men, is emphasized.

Part 9, Morale, treats the subject of morale and esprit de corps, their importance to an effective organization, and how a leader's actions influence the individual followers and the group collectively.

The ability to instill a willingness in one's self or one's followers to act correctly under adverse conditions is essential for a naval leader. The most desirable situation exists in a military organization when each member willingly chooses to do the right thing because it is the right thing, rather than doing it only because of fear of the consequences of not doing it. Such is the nature of discipline as treated in Part 10, Discipline -- the positive aspect of discipline as opposed to the negative or punitive connotation.

An organization, properly managed by appointed leaders, prepares for the continuity of leadership of that organization. Essential to the selection and training of leaders, as well as the maintenance of high standards is a personnel evaluation process. Part 11, Personnel Evaluation, provides the midshipman with a knowledge of the system by which he is himself evaluated and introduces him to the role of evaluator which he must fill as a leader.

Part 12, Applied Leadership, serves as a review and synthesis of the course. Situational examples are provided for the midshipman to observe the application of material.

The twelve parts identified in Table 12 represent major content areas. Each part is divided into varying numbers of segments, ranging from as few as two in Part 1 to as many as ten segments in Part 5. A segment is a collection of learning objectives closely related by content which can be studied in about an hour's time.

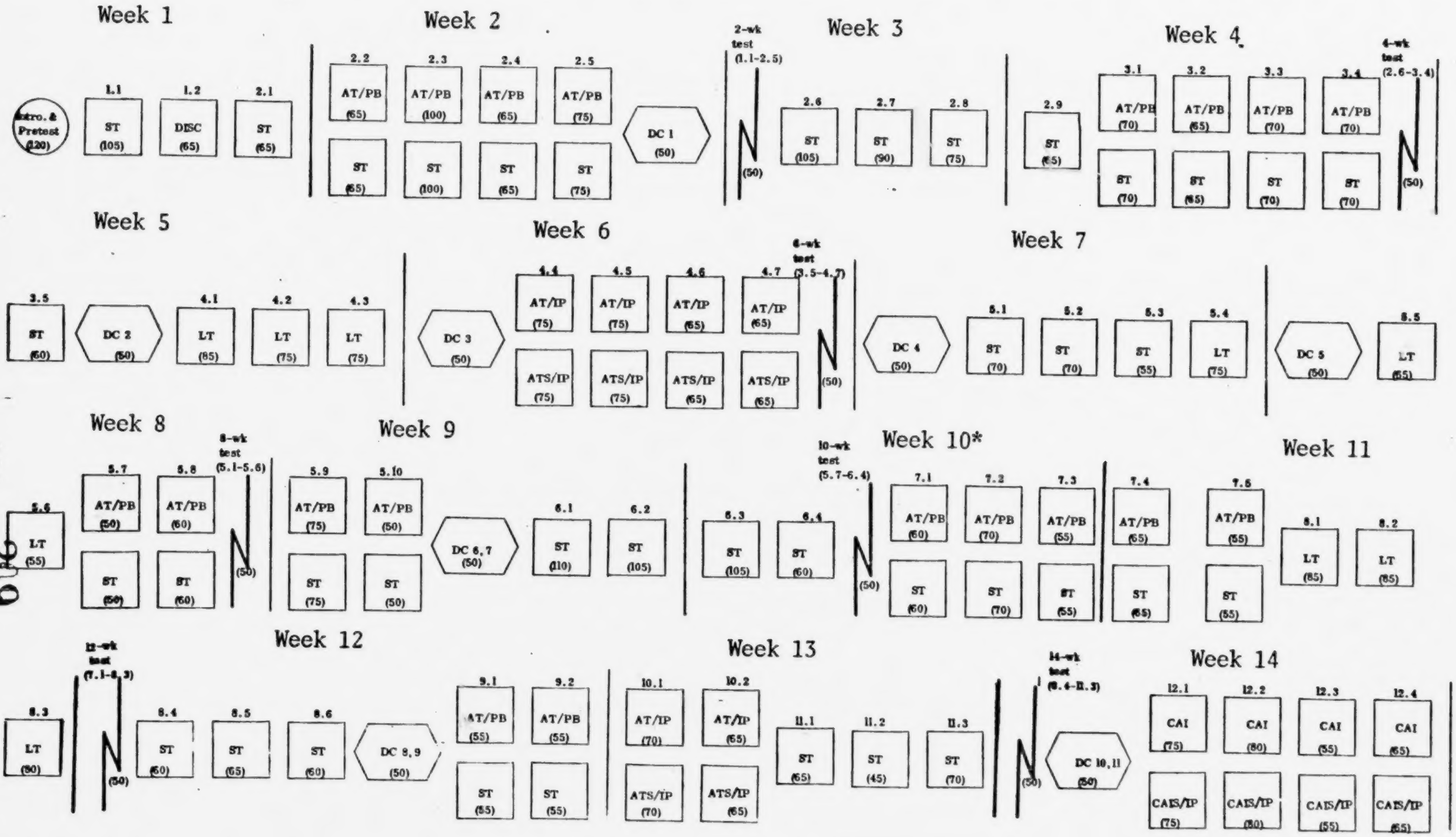
Final Course Structure and Operation

The Course Activities Chart on page 196 shows the sequence in which the 59 segments and all other events will occur. The chart should be read starting at the upper left (Introduction and Pretest) and following the numbering of the segments from 1.1, 1.2, 2.1 ... 12.4. Each segment bears a dual number - the first is the part number and the second is the number of the segment within the part. Each square in the chart represents a segment with the segment number given above the square. The identification of the type of material as well as a time estimate for that segment is inside the square. The time estimate for each segment is the average number of minutes needed by the student to work through the instructional materials, including the Progress Check and remediation (if necessary).

The same instructional content may be available in more than one media. In this case, two boxes are shown under a

COURSE ACTIVITIES C.. .AT

INTRODUCTION TO PSYCHOLOGY AND LEADERSHIP


Week 1
Intro. & Pretest (120)
1.1 ST (105)
1.2 DISC (65)
2.1 ST (65)
Week 2
2.2 AT/PB (65) ST (65)
2.3 AT/PB (100) ST (100)
2.4 AT/PB (65) ST (65)
2.5 AT/PB (75) ST (75)
DC 1 (50)
2-wk test (1.1-2.5) (50)
Week 3
2.6 ST (105)
2.7 ST (90)
2.8 ST (75)
2.9 ST (65)
Week 4
3.1 AT/PB (70) ST (70)
3.2 AT/PB (65) ST (65)
3.3 AT/PB (70) ST (70)
3.4 AT/PB (70) ST (70)
4-wk test (2.6-3.4) (50)
Week 5
3.5 ST (60)
DC 2 (50)
4.1 LT (85)
4.2 LT (75)
4.3 LT (75)
Week 6
DC 3 (50)
4.4 AT/IP (75) ATS/IP (75)
4.5 AT/IP (75) ATS/IP (75)
4.6 AT/IP (65) ATS/IP (65)
4.7 AT/IP (65) ATS/IP (65)
6-wk test (3.5-4.7) (50)
Week 7
DC 4 (50)
5.1 ST (70)
5.2 ST (70)
5.3 ST (55)
5.4 LT (75)
DC 5 (50)
5.5 LT (65)
Week 8
5.6 LT (55)
5.7 AT/PB (50) ST (50)
5.8 AT/PB (60) ST (60)
8-wk test (5.1-5.6) (50)
Week 9
5.9 AT/PB (75) ST (75)
5.10 AT/PB (50) ST (50)
DC 6,7 (50)
6.1 ST (110)
6.2 ST (105)
6.3 ST (105)
6.4 ST (60)
10-wk test (5.7-6.4) (50)
Week 10*
7.1 AT/PB (60) ST (60)
7.2 AT/PB (70) ST (70)
7.3 AT/PB (55) ST (55)
7.4 AT/PB (65) ST (65)
7.5 AT/PB (55) ST (55)
Week 11
8.1 LT (85)
8.2 LT (85)
Week 12
8.3 LT (80)
12-wk test (7.1-8.3) (50)
8.4 ST (60)
8.5 ST (65)
8.6 ST (60)
DC 8,9 (50)
9.1 AT/PB (55) ST (55)
9.2 AT/PB (55) ST (55)
Week 13
10.1 AT/IP (70) ATS/IP (70)
10.2 AT/IP (65) ATS/IP (65)
11.1 ST (65)
11.2 ST (45)
11.3 ST (70)
14-wk test (8.4-11.3) (50)
DC 10,11 (50)
Week 14
12.1 CAI (75) CAIS/IP (75)
12.2 CAI (80) CAIS/IP (80)
12.3 CAI (55) CAIS/IP (55)
12.4 CAI (65) CAIS/IP (65)

* Spring Break probably occurs in this time period, so the tenth instructional week encompasses more work to be spread over two calendar weeks, including the leave period. For a Fall semester, a comparable adjustment must be made for the Christmas leave.

LEGEND

AT/IP = Audiotape/Intrinsically Programed Booklet
ATS/IP = Audiotape Script/Intrinsically Programed Booklet
AT/PB = Audiotape/Panel Book
CAI = Computer Assisted Instruction
CAIS/IP = CAI Script/Intrinsically Programed Booklet
DC = Depth Core Sessions
DISC. = Group Discussion
LT = Linear Text
ST = Syndactic Text
( ) = Estimated time of Activity

Admin. Test

Completion dates of minimum units of materials segment number in the chart and the media options are identified. For ease of distribution and handling, several segments of like media have been bound into a single volume. The choice of media is up to the student, however, for logistic and administrative reasons, the student selecting a media option for a given segment should continue with all other segments in that same volume, rather than selecting a different media for an adjacent segment. For example, if a student uses the Audiotape/Panel Book (AT/PB) materials in 2.2, he should continue with the Audiotape/Panel Book version through Segment 2.5. Table 8 shows the volume numbers, segments included in that volume, and media options for identical instructional content, where available.

Other events detailed on the Course Activities Chart include depth core (DC), administrative tests and the minimum pace to be maintained by the student in the course. The depth core is an in-class discussion session with required attendance which aims at looking "in depth" at content covered in previous segments. Although eight depth core meetings have been scheduled in the Course Activities Chart, the instructor may supplement or delete the scheduled depth core sessions. The student is responsible for checking the board for depth core schedules and for attending the meetings. Generally, the depth cores have been developed on the assumption that

TABLE 8

SEGMENTS BY VOLUME AND MEDIA EMPLOYED

Volume Number	Segments Included	Prime Media	Alternate Media	Volume Number
I	1.1	Syndactic text		
	1.2	Discussion booklet		
II-A	2.1	Syndactic text	Syndactic text	II-B
	2.2	Audiotape/Panel book	Syndactic text	
	2.3	Audiotape/Panel book	Syndactic text	
	2.4	Audiotape/Panel book	Syndactic text	
	2.5	Audiotape/Panel book	Syndactic text	
II-C	2.6	Syndactic text		
	2.7	Syndactic text		
	2.8	Syndactic text		
	2.9	Syndactic text		
III-A	3.1	Audiotape/Panel book	Syndactic text	III-B
	3.2	Audiotape/Panel book	Syndactic text	
	3.3	Audiotape/Panel book	Syndactic text	
	3.4	Audiotape/Panel book	Syndactic text	
	3.5	Syndactic text	Syndactic text	
IV-A	4.1	Linear text		
	4.2	Linear text		
	4.3	Linear text		
	4.4	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	IV-Script
IV-B	4.5	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	
	4.6	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	
	4.7	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	
V-A	5.1	Syndactic text		
	5.2	Syndactic text		
	5.3	Syndactic text		
	5.4	Linear text		
	5.5	Linear text		
	5.6	Linear text		
V-B	5.7	Audiotape/Panel book	Syndactic text	V-C
	5.8	Audiotape/Panel book	Syndactic text	
	5.9	Audiotape/Panel book	Syndactic text	
	5.10	Audiotape/Panel book	Syndactic text	

TABLE 8 (Continued)

Volume Number	Segments Included	Prime Media	Alternate Media	Volume Number
VI-A	6.1	Linear text		
	6.2	Linear text		
VI-B	6.3	Linear text		
	6.4	Syndactic text		
VII-A	7.1	Audiotape/Panel book	Syndactic text	VII-B
	7.2	Audiotape/Panel book	Syndactic text	
	7.3	Audiotape/Panel book	Syndactic text	VII-C
	7.4	Audiotape/Panel book	Syndactic text	
	7.5	Audiotape/Panel book	Syndactic text	
VIII-A	8.1	Linear text		
	8.2	Linear text		
	8.3	Linear text		
VIII-B	8.4	Syndactic text		
	8.5	Syndactic text		
	8.6	Syndactic text		
IX-A	9.1	Audiotape/Panel book	Syndactic text	IX-B
	9.2	Audiotape/Panel book	Syndactic text	
X	10.1	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	X Script
	10.2	Audiotape/Intrinsically Programed booklet	Tape script & Intrinsically Programed booklet	
XI	11.1	Syndactic text		
	11.2	Syndactic text		
	11.3	Syndactic text		
	12.1	Computer-Assisted Instruction	Intrinsically Programed booklet	XII-A
	12.2	Computer-Assisted Instruction	Intrinsically Programed booklet	XII-B
	12.3	Computer-Assisted Instruction	Intrinsically Programed booklet	XII-C
	12.4	Computer-Assisted Instruction	Intrinsically Programed booklet	XII-D

the students will have completed all segments which precede the depth core in the Course Activitites Chart. To gain maximum benefit from the group discussions, therefore, the student should ensure that he has finished the requisite materials which precede a depth core meeting. The instructor has the option of grading his students on their participation in depth core sessions.

Administrative tests are USNA tests on which the student's grade will be based. Seven administrative tests at two-week intervals are scheduled in the Course Activities Chart. The segments covered in each test are listed in the chart next to each test. The instructor has the option to override the testing schedule in the chart by testing less frequently (such as every four weeks) or testing over different segments of materials. As with depth core sessions, advance notification of tests will be given by the instructor or posted on the board outside The Course Administrator's Office. A final examination on the entire content of the course will be administered during the regular exam week.

In this individualized system a great deal of responsibility for the timely completion of materials will be placed on the student. To aid the student in properly allocating his study time, a minimum pace has been indicated in the Course Activities Chart by grouping the segments into one week's work of five-six hours. This is the least amount of effort expected of the student if he is to be prepared for depth core meetings and administrative tests. There is no upper limit to the speed with which the student may proceed through the course. Indeed the student may find it helpful to complete the course materials long before the semester is over.

Although not indicated in the Course Activities Chart, another form of instructional material, the Enrichment Unit, will be available to the students. Enrichment Units are related to, but not essential to, the mastery of the overall objectives. The student whose interest is stimulated should discuss the options available with his instructor.

Instructional Media Employed

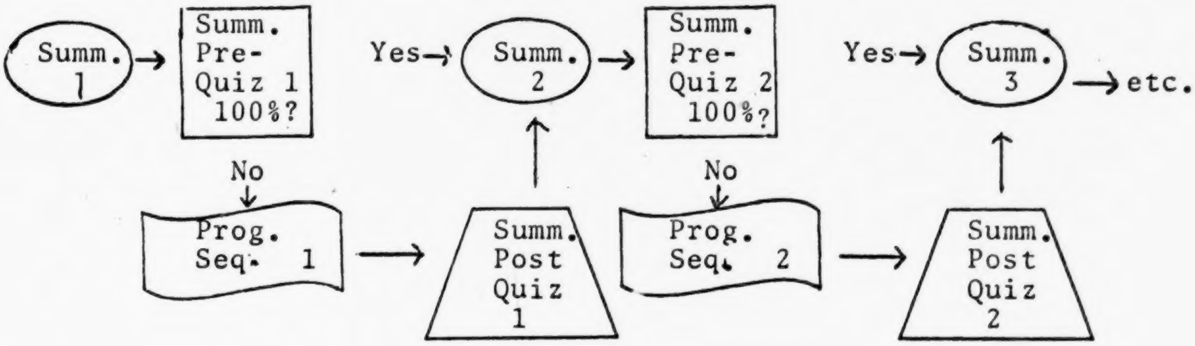
This section describes the types of materials the student will encounter and gives directions on how the materials are to be studied.

The Linear Text should present no difficulties for the first-time user of programed instruction. A linear text is constructed in a series of frames; a frame may consist of a small bit of teaching information plus a question demanding a student response, or solely of a question pertaining to prior teaching. The student studies the linear text by beginning with frame 1 and working sequentially through the frames, verifying his frame responses by unfolding the Program Frame Answer Sheet (Sample in Appendix G) at the back of the instructional volume.

The Syndactic Text has two components: a Summary and a Programed Sequence. The student begins by reading a brief statement of a given body of learning material (Summary 1). He then takes Summary Pre-Quiz 1 (generally five questions) to test comprehension and retention of the material just read. The student checks his responses against the correct answers given in the text.

If he has answered all questions correctly, he proceeds to the next summary, Summary 2, and to Summary Pre-Quiz 2, and so on. If the student has incorrectly answered one or more questions on Summary Pre-Quiz 1, he is directed through Programed Sequence 1. This sequence of linear frames provides detailed learning of the material presented in the Summary. As he works through the Programed Sequence, the student may check his responses to questions in the frames by unfolding the Program Frame Answer Sheet (Appendix G.) which is bound at the back of the volume. When the student has finished Programed Sequence 1, he will take Summary Post-Quiz 1, and check his answers against the correct answers given in the text. He then goes on to Summary 2 where the same procedural cycle is repeated.

The following flow chart will assist those who may have difficulty with this instructional method:



Summ. 1
Summ. Pre-Quiz 1 100%?
Yes
Summ. 2
Summ. Pre-Quiz 2 100%?
Yes
Summ. 3
etc.
No
Prog. Seq. 1
Summ. Post Quiz 1
No
Prog. Seq. 2
Summ. Post Quiz 2

The Intrinsically Programed Booklet is commonly referred to as a "scrambled" book. By design, the student cannot work sequentially through the text. Rather, a page will present instructional material and direct the student to another page where a multiple-choice question is posed.

There are two types of questions in the Booklet. For the first type of question, the student selects his response, checks it against the correct answer provided on the Program Frame Answer Sheet, (Appendix G.), and follows the directions printed on the bottom of the question page to proceed to the next set of instruction material.

The other type of question is called a "branched" question because it branches the student to different pages depending on the response he selects. There is no blanket direction printed on the bottom of this question page - instead each possible response sends the student to a different page. The student is to select his response, and turn to the page indicated on the question page for his particular response. On this new page, his response will be analyzed. If the response is totally incorrect, the student is directed back to the question page to select another response. If his original response is wholly or partially correct, the student is directed to a new set of instructional material.

The Intrinsically Programed Booklet is to be used in conjunction with either an audiotape or the written version (script) of an audiotape. If a tape is used, the student will listen to the first portion of the tape and follow directions on the tape to turn to a page in the Intrinsically Programed Booklet. He will work through part of the Booklet until he is instructed to read the next portion of the tape. If the student is using the script instead of the tape, he will read the first portion of the script and follow directions in the script to turn to a page in the Intrinsically Programed Booklet. He will work through part of the Booklet until he is instructed to read the next portion of the script.

The explanation of the procedures to follow in working through an Audiotape/Intrinsically Programed Booklet or an Audiotape Script/Intrinsically Programed Booklet may appear complex, but the actual use of these materials will be easy because the student receives clear directions on every page as to the route he is to take through the materials.

If the student fails to attain 80% correct on the first trial of the Progress Check, he must go through a remediation cycle. The remediation material is the script which accompanies the Intrinsically Programed Booklet.

The Audiotape/Panelbook media mix is another type of learning material the student will encounter in this course. The instruction is delivered via an audiotaped lecture which is supplemented by a panelbook containing illustrations, charts and questions. The student listens to the tape until the lecturer instructs him to "turn to Item 1" or "answer Question 2" in the panelbook. The student may turn off the tape recorder if he needs more time to answer the question. Answers to the panelbook questions are found on the Program Frame Answer Sheet (Sample: Appendix G.).

If the student does not score 80% correct on the first trial of the Progress Check, he must remediate. In the case of the audiotape/panelbook segments, the remediation material is the written version of the tape, the audio script. The script is bound in the volume following the panelbook and Progress Check for each segment.

Computer Assisted Instruction is a media option in the last four segments of the course. All instruction is delivered via computer terminals and the student enters into the terminal his responses to questions in the material. The Progress Checks are in the usual printed form but remediation is done "on line" via the computer. The student will receive detailed instructions from the computer center on interacting with the terminal.

An alternative to the medium of Computer Assisted Instruction is a paper version incorporating the Computer Assisted Instruction Script and Intrinsically Programed Booklet. For an explanation on its use, the student should read the discussion on the use of the Audiotape Script/Intrinsically Programed Booklet.

Regardless of the type of instructional material, each segment will have the same general format. There is a foreword for each segment, followed by the instructional materials. At the end of the instructional materials there is a Progress Check (PC) consisting of approximately 10 items. After the

Progress Check is a page entitled Progress Check Answer and Remediation Form (Sample: Appendix H). Materials to be used as remediation (if different from the original instruction) follow the Progress Check Answer and Remediation Form. This sequence is repeated for each segment within a volume.

Depth Core

The overall design of the course was intended to provide a full, yet flexible series of educational experiences that would insure optimum possible benefit for each student in the course. Hence, depth core units, enrichment modules and remedial lessons were developed to round out the basic core instructional segments.

The fifty nine core segments basically attend to the cognitive domain of the learner. It was generally believed that a course in leadership, psychology, and management should attempt to address the affective domain, especially since the interpersonal dynamics in leadership situations is so vital. Over the course of the contract, a series of seventeen depth core units were developed which served two purposes in the course. The first is the integration of relatively discrete skills into higher order learning experiences. Secondly, the depth core units, constructed primarily for a group mode, allow for directed interaction between the group and the instructor - not easily possible in a self-paced individualized course.

The depth core units, while compiled in a single syllabus, are independent of each other. They all have the following section format:

1. Purpose of presentation
2. Statement of intention
3. Objectives of presentation
4. Approach to presentation
5. Student handout
6. Discussion questions and responses
7. Evaluation and procedures.

The *statement of intention*, *objectives of presentation* and the *approach to presentation* sections give the instructor the rationale, goals, and procedures for implementing the depth core unit. The *student handout* consists of either a script, narrative, or problem statement which the student works through either by himself and/or with other class members. The *discussion questions and responses* section gives the instructor some specific methodology for inductively bringing the group to either new insights or behavior. While there are no right or wrong answers, possible answers, which have a validity in the theoretical concept of the depth core, are offered. The *evaluation procedures* section suggests some ways by which the instructor can rate the performance of the group or the individual.

In general, there is an attempt to give practical experience in applying the cognitive principles of the course, to allow an atmosphere for insight into the dynamics of leadership, and finally, to allow some self-assessment on the individual student's predilection to have his effectiveness influenced by the variabilities of the group, the situation, and his own personality.

Table 9 lists the Depth Core Units available to the instructor.

Appendix I is a sample of a Depth Core Unit.

Table 9

Depth Core Units

Depth Core # 1: *Perception and Leadership*

Depth Core # 2: *Brainstorming and Group Pressure*

Depth Core # 3: *Leavitt-Mueller Experiment*

Depth Core # 4: *Achieving Effective Communication*

Depth Core # 5: *Preparing a Plan*

Depth Core # 6: *Allocation of Resources in Crisis Situation/NASA Film*

Depth Core # 7: *Group Ordering of Critical Factors*

Depth Core # 8: Counseling Role Playing

Depth Core # 9: *Responsibility of Junior Officer Counseling*

Depth Core #10: *Adjustment and Maladjustment/ Mental Health and Therapy*

Depth Core #11: *Design of New Enlisted Performance Evaluation Form*

Depth Core #12: Dropped from the syllabus

Depth Core #13: *Black Awareness in the Armed Forces: Race Relations*

Depth Core #14: *The Drug Problem and Drug Awareness*

Depth Core #15: *The Leader and the Situation*

Depth Core #16: *The World of CHARLIE Company, Part I*

Depth Core #17: *The World of CHARLIE Company, Part II*

Enrichment Modules

Westinghouse Learning Corporation, in its efforts to bring innovative learning materials to the project, commissioned Structural Communications, Ltd. of London, England to develop eight units of materials based on a new and proprietary technique of discussion materials. The Structural Communications materials were designed and developed to coincide with eight of the basic instructional units in the core course and were so constructed as to allow individual or group activity. The fundamental philosophy of Structural Communications is that the students, either individually or collectively, can be brought to greater understanding regarding the subtleties of concepts through continual dialogue with the authors. The philosophical foundation for this approach is best described in (The Progress of Educational Technology, Bennet and Hodgson, 1968). In laymen's terms, Structural Communications postulates that students can be brought to ascending levels in the understanding of complex structures through non-linear, i.e. program or sequential, strategies.

The basic strategy of a Structural Communications unit is to have the student work through the orientation of the central focus or unifying theme which dominates the problems presented in a brief series of modules. Each successive module contains a problem of consideration which explores one particular facet of the central thesis. It is stated briefly and pointedly. The student then refers to a matrix of statements, usually twenty four in number, which the student must then examine to determine the appropriate relevance or irrelevance to the problem he is considering. After making his decision, he may immediately turn to the discussion section which analyzes the skill and eliminate or choose appropriate statements from the matrix. If he is working with a group he may discuss his individual choice with others to arrive at a group consensus before proceeding to the discussion section. As the student moves from module to module, his total grasp of the elements of the theme and their interaction becomes greater. The end product is a decidely enlightened student who has been subtly tracked through several levels of abstract reasoning.

When Structural Communications was first introduced on a trial basis, the optimum condition demanded that students work through all modules of the unit in a single session. Since this meant nearly three hours of discussion and dialogue, student reaction was not always favorable. While the dialogues and ideas were interesting, the students were constrained by time. In the revised and final product, both the individual and the group mode is permitted. Additionally, modules within a unit can be worked through separately - hence more convenient time blocks can be accommodated.

Table 10 lists the structural communications units and sub-modules.

Space does not permit an enclosure of a structural communications module, even as an appendix to this report.

Table 10

Enrichment Units
Structural Communications

Enrichment I: Concept of Leadership
- Module 1: Leadership in a Civilian Organization
- Module 2: Riot Leadership
- Module 3: Naval Leadership

Enrichment II: Problems in Individual Behavior
- Module 4: Case of the Missing Ensign
- Module 5: Case of the Angry Seaman
- Module 6: Case of the Liquidated Project
- Module 7: Case of the Antarctic Accident

Enrichment III: Group Dynamics and the Chain of Command
- Module 8: Group Dynamics in a Naval Air Squadron
- Module 9: Recognition of Structure in the Group
- Module 10: Social Climates for Leadership
- Module 11: Engineering a Group Situation

Enrichment VI: Problems of Leadership
- Module 12: The Case of the Missing Ham
- Module 13: The Case of the Unmoved Files
- Module 14: The Case of the Efficient Ensign

Enrichment VIII: The Motivation of Subordinates
- Module 15: Motivation
- Module 16: Taking Command
- Module 17: Logistics
- Module 18: Leadership

Enrichment XA: Discipline and the Group
- Module 19: The Prison - the unwilling inmate
- Module 20: The Monastic Community - the voluntary prisoner
- Module 21: The Scattered Organization

Enrichment XB: Discipline and the Individual
- Module 22: American P.O.W.'s in Korea
- Module 23: American P.O.W.'s in Korea (Captor's Approach to Eroding P.O.W. Discipline)
- Module 24: Tension on Board a Destroyer
- Module 25: Student Unrest

TABLE 10 cont.

Enrichment XII: Learning to Lead
    Module 26: The Upward Mobile Ensign
    Module 27: The Ideal Ensign
    Module 28: Three Perspectives of the Junior Officer

Remedial Procedures

In the final course product, provisions for remediation are diverse, yet practical. Table 11 indicates the variety and type of remediation sources.

In general it should be noted that remedial materials for hardware oriented presentations is available in a persistent medium. Thus, where audio tapes or CAI might fail to bring students to criterion performance, a programmed version of the material or the script of the tape itself is available. Where hard cover materials constitute the initial presentation, the students are rerouted through the same material. When the primary source is a syndactic text, the student has an option of either reviewing the summary statements or working through the programmed sequences.

The actual mechanism for determining the necessity of remediation is the Progress Check Answer and Remediation Form located at the end of each segment (see Figure 15). The student records his answers on a separate sheet and checks them against the answers. If he misses more than two of the items, he is required to review the entire segment. The location for specific trouble areas is listed in the remediation reference column.

TABLE 11

REMEDIAL MEDIA

Volume Number	Segments Included	Initial Instructional Media	Remedial Media	Volume Number
I	1.1	Syndactic text		
	1.2	Discussion booklet		
II-A	2.1	Syndactic text	Syndactic text	II-B
	2.2	Audiotape/Panel book	Syndactic text	
	2.3	Audiotape/Panel book	Syndactic text	
	2.4	Audiotape/Panel book	Syndactic text	
	2.5	Audiotape/Panel book	Syndactic text	
II-C	2.6	Syndactic text		
	2.7	Syndactic text		
	2.8	Syndactic text		
	2.9	Syndactic text		
III-A	3.1	Audiotape/Panel book	Syndactic text	III-B
	3.2	Audiotape/Panel book	Syndactic text	
	3.3	Audiotape/Panel book	Syndactic text	
	3.4	Audiotape/Panel book	Syndactic text	
	3.5	Syndactic text	Syndactic text	
IV-A	4.1	Linear text		
	4.2	Linear text		
	4.3	Linear text		
	4.4	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	IV-Script
IV-B	4.5	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	
	4.6	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	
	4.7	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	
V-A	5.1	Syndactic text		
	5.2	Syndactic text		
	5.3	Syndactic text		
	5.4	Linear text		
	5.5	Linear text		
	5.6	Linear text		
V-B	5.7	Audiotape/Panel book	Syndactic text	V-C
	5.8	Audiotape/Panel book	Syndactic text	
	5.9	Audiotape/Panel book	Syndactic text	
	5.10	Audiotape/Panel book	Syndactic text	

TABLE 11 (Continued)

Volume Number	Segments Included	Initial Instructional Media	Remedial Media	Volume Number
VI-A	6.1	Linear text		
	6.2	Linear text		
VI-B	6.3	Linear text		
	6.4	Syndactic text		
VII-A	7.1	Audiotape/Panel book	Syndactic text	VII-B
	7.2	Audiotape/Panel book	Syndactic text	
	7.3	Audiotape/Panel book	Syndactic text	VII-C
	7.4	Audiotape/Panel book	Syndactic text	
	7.5	Audiotape/Panel book	Syndactic text	
VIII-A	8.1	Linear text		
	8.2	Linear text		
	8.3	Linear text		
VIII-B	8.4	Syndactic text		
	8.5	Syndactic text		
	8.6	Syndactic text		
IX-A	9.1	Audiotape/Panel book	Syndactic text	IX-B
	9.2	Audiotape/Panel book	Syndactic text	
X	10.1	Audiotape/Intrinsically Programed booklet	Tape Script & Intrinsically Programed booklet	X Script
	10.2	Audiotape/Intrinsically Programed booklet	Tape script & Intrinsically Programed booklet	
XI	11.1	Syndactic text		
	11.2	Syndactic text		
	11.3	Syndactic text		
	12.1	Computer-Assisted Instruction	Intrinsically Programed booklet	XII-A
	12.2	Computer-Assisted Instruction	Intrinsically Programed booklet	XII-B
	12.3	Computer-Assisted Instruction	Intrinsically Programed booklet	XII-C
	12.4	Computer-Assisted Instruction	Intrinsically Programed booklet	XII-D

FIGURE 15

PROGRESS CHECK ANSWER AND REMEDIATION FORM

PART Eight SEGMENT IV

REMEDIATION TEXT Syndactic Text-Volume VIII-B

ITEM	ANSWER	REMEDIATION REFERENCE
1	b	Summary 1 Pages 1-2
2	d	Summary 1 Page 1
3	d	Summary 1 Pages 3-4
4	c	Summary 1 Pages 3-4
5	a	Summary 2 Pages 30-32
6	c	Summary 2 Page 28
7	b	Summary 2 Pages 30-32
8	c	Summary 2 Page 30
9	a	Summary 2 Page 32
10	d	Summary 2 Page 33
11		
12		
13		
14		
15		

Individualization Within the Course

As the original specifications for the project suggested, "there are many facets to the total question of individualization of instruction." It went on to suggest some of the methods whereby the process of individualization could be implemented in the course product. The first was that optional objectives, above and beyond the core curriculum, should be part of the total design. With respect to the media of instruction, the specifications suggested that the optimum medium would be selected after alternative presentations had been prepared and tested. Thirdly, individualization could be achieved by some branching procedures after pretests for prior competencies. Finally, individualization would be possible by making self-paced instruction the modus operandi for the instructional system.

Westinghouse Learning Corporation was able to achieve significant strides in meeting these four requests for individualized operations. Indeed, individualization was such an intregal part of the entire development program, it was almost difficult to separate this concept out of the development effort and discuss it separately.

Hopefully, some of the discussion to follow will illuminate one contractor's effort to achieve individualization with sufficient clarity and demonstrable value such that anyone interested in developing a self-paced individualized course will be willing to extend the effort, knowing the rewards that can accrue.

Since this report deals with the final course design as the end product, a discussion of individualization for the final package is perhaps the most appropriate. In addition to the core curriculum of 59 instructional segments, seventeen depth core segments are available. As additional options for achievement within the course, these depth cores can be utilized to maximize individual interest and motivation while fulfilling the basic intention of integrating core objectives at a higher level of understanding. The depth cores are discussed in more detail on page 208, and an example is provided in Appendix I.

Additional enrichment is available through 27 Structural Communication modules which are available in either an individualized or group mode. Although formal objectives, tested by specific criterion measures were not developed for these Structural Communication modules, their absence does not preclude their use as incentive to greater individual achievement. Indeed, the Structural Communication units, discussed in more detail on page 212, do not lend themselves to criterion referenced testing since they can be best described as dialogues on case studies of leadership.

Thus, in addition to the 59 core segments of instruction, a total of 40 hours of additional materials were prepared with the express purpose of allowing optional course objectives to be attained.

With respect to media, the final course product allows alternative paths for much of the instruction. In addition to fulfilling the requirement for selecting the optimum medium of instruction, the final course product allows alternative paths where the student's opportunity for individualization would be diminished by a reliance on hardware bound instruction. Additionally, the potential for individualization extends beyond criterion performance and takes student preference into account.

Specifically, when the question arose as to the feasibility of having a large student population utilize the computer aided instruction facility at the Academic Computer Center, the instruction prepared for the CAI medium was recast into an alternate medium, an intrinsically programed text. This new format, surprisingly, proved as effective as the more sophisticated hardware medium version. Further details on the statistical results of the study are available in TR-6.15 and TR-6.18.

Further, the potential requirement for supplying audio tape cassette recorders for a large number of students was instrumental in the conversion of all audio tape lectures into hard copy program materials. This move was also conditioned by the data which indicated that only a limited number of students, approximately 20%, showed a real interest in using the lecture tapes. Table 8 shows the full range of media options contained in the final course package.

Individualization, through branching procedures, likewise is inherent in the course. This project provided the first, large scale testing of a unique program materials format labeled a syndactic text. The syndactic text is a distinct individualized teaching device. Each unit of instruction is divided into three or more sub units which contain summary narratives of the instructional content, a brief quiz and a detailed, programmed sequence for the content, and a final quiz. Both prior competencies and rapid learning rates are rewarded if the student successfully completes the summary quiz and he is allowed to bypass the detailed programmed sequence for that section. The syndactic text, understandably one of the more popular media in the course product, is available to the student in thirty eight segments.

Additionally, branching as a technique to reward the able student, is available in other media throughout the course. The intrinsically programmed text, more generically known as scrambled text, allows the student to move quickly through material that he masters. The branching, conditioned only by incorrect responses, does not slow down the fast learner. This instrinsically programmed branching format is available in fourteen segments.

Finally, the computer assisted instructional format on the IBM 1500 system needs no discussion on its branching and individualizing capability. In the final course package, four segments of instruction are available in this medium.

The self-pacing requirement for the instructional system is realized through the logistical management of the course. Regular class meetings to attend lectures, as required by traditional courses, were abolished. The student reports to the Administrative Resource Room (see Figure 16) to draw or return materials and equipment. An Individualized Study and Carrel Room located nearby (see Figure 17) provides the student with space for private study or test taking. An instructor is available at all

Figure [illegible]

Administration & Resource Room

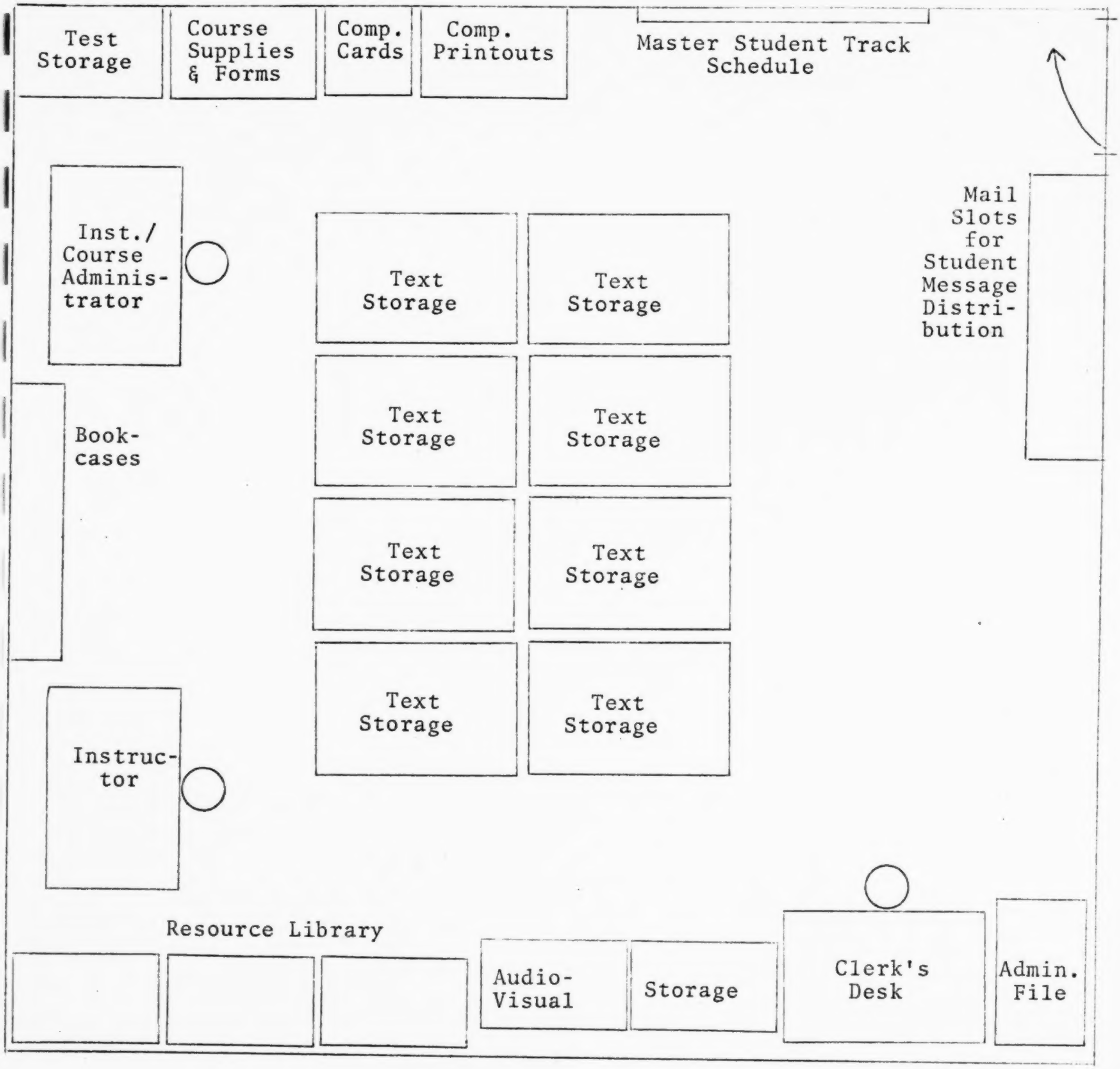
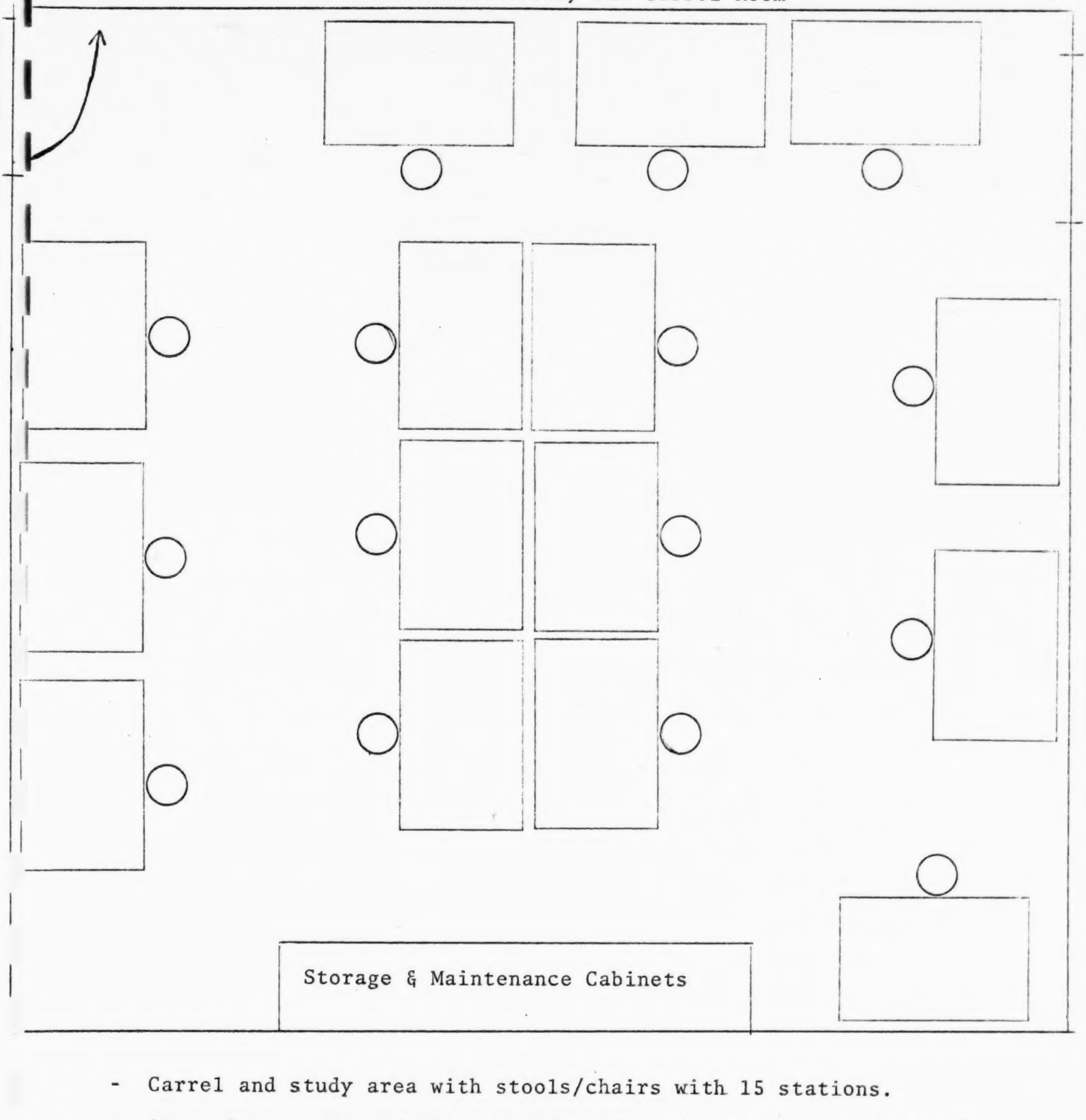

Test Storage
Course Supplies & Forms
Comp. Cards
Comp. Printouts
Master Student Track Schedule
Inst./ Course Administrator
Text Storage
Text Storage
Mail Slots for Student Message Distribution
Text Storage
Text Storage
Book-cases
Text Storage
Text Storage
Text Storage
Text Storage
Instructor
Resource Library
Audio-Visual
Storage
Clerk's Desk
Admin. File

Figure 17

Individualized Study and Carrel Room


Storage & Maintenance Cabinets

- Carrel and study area with stools/chairs with 15 stations.
- Approximate accommodations for 75-100 students, assuming a ratio of 3/A:1 in "on demand" basis.
- Size: 23/24

times for tutoring, therefore insuring assistance to the student on an individualized, as needed, basis. Further details on the role of the instructor in fulfilling his contribution to individualization is available in the Course Instructor Guide. Thus, the student can proceed through the entire course as quickly as he desires. The student is virtually without constraints to individualize his achievement.

Comparative Analyses of the Effectiveness of the Three Implementations

In judging adequacy of segment performance, WLC established a criterion of 80 - 80, that is, 80% of the students must correctly answer 80% of the progress check test items, if not on the first attempt (before remediation), then on the second attempt (after remediation) or in individual tutoring sessions. Table 12 reports the percentage of students achieving the 80% criterion level before remediation on each of the three course implementations. The mean percentages in this table show a vast improvement in overall segment performance from 80% - 57% in the first run, to 80% - 82% in the second run, and 80% - 94% in the final run. These data reveal that the requirement of the two revision cycles to reduce the need for remediation and tutoring was amply satisfied. In the third run there are only four segments (2.3, 2.6, 2.7, 3.4) which do not meet the 80 - 80 criterion before remediation. It should be pointed out that in three of these segments the number of test items was 8 or 9 rather than the customary 10. Actually only one segment (Segment 2.3) in the final run fell below the 80 - 80 criterion based on a 10-item progress check, and this was a marginal drop (77%). In the final run all students achieved at least 80% correct or better after remediation, and there were no instances in which tutoring was necessitated. Thus, in assessing the final run of the

Table 12

Percentage of Students, by Segment, Attaining 80% or Better on Progress Checks Before Remediation, Across Three Implementations

Segment Number	First Run	Second Run	Third Run
1.1	70.5	91.1	94.9
1.2	75.0	80.0	85.7
2.1	65.9	86.7	95.9
2.2	31.8	85.7	91.8
2.3	18.2	35.7	76.6
2.4	34.9	69.0	88.8
2.5	25.0	88.1	97.9
2.6	40.9	68.3	69.4
2.7	11.4	42.9	73.5
2.8	86.4	88.1	93.9
2.9	36.4	90.5	96.9
3.1	22.7	40.5	80.4
3.2	20.5	69.0	86.6
3.3	63.6	40.5	100.0
3.4	72.1	88.1	73.5
3.5	83.7	95.2	90.8
4.1	61.4	95.2	97.9
4.2	88.6	100.0	96.8
4.3	88.6	83.3	94.8
4.4	95.5	97.7	98.9
4.5	43.2	100.0	96.9
4.6	52.3	97.7	97.9
4.7	68.2	95.5	95.9
5.1	43.2	90.9	90.8
5.2	22.7	40.9	86.7
5.3	52.3	95.5	97.9
5.4	25.0	75.0	93.9
5.5	4.5	72.7	96.9
5.6	13.6	79.5	87.8
5.7	52.3	81.8	96.9
5.8	77.3	86.4	93.8
5.9	39.5	56.8	93.8
5.10	20.9	95.5	91.8

Table 12 cont.

Segment Number	First Run	Second Run	Third Run
6.1	50.0	95.5	95.9
6.2	72.7	81.8	96.9
6.3	95.5	86.4	94.9
6.4	79.5	95.3	95.9
7.1	18.2	69.8	92.6
7.2	45.5	90.7	97.9
7.3	34.1	69.8	92.6
7.4	59.1	60.5	93.7
7.5	43.2	76.7	98.9
8.1	70.5	86.0	93.7
8.2	42.9	97.7	97.9
8.3	88.6	97.7	100.0
8.4	43.2	97.7	100.0
8.5	60.5	88.4	92.4
8.6	56.8	79.1	95.7
9.1	68.2	93.0	98.9
9.2	93.2	93.0	98.9
10.1	90.9	97.7	98.9
10.2	95.5	97.7	100.0
11.1	70.5	74.4	97.8
11.2	88.6	100.0	100.0
11.3	52.3	95.3	81.5
12.1	84.1	97.7	100.0
12.2	59.1	74.4	98.9
12.3	97.7	93.0	96.7
12.4	84.1	67.4	98.9
Mean, All Segments	56.8	82.4	93.5

course by percent-percent standards, 55 segments meet or greatly exceed the 80 - 80 criterion before remediation, and only 4 segments were below this level. After remediation, all segments met the 80 - 80 criterion.

Table 13 lists by segment the mean progress check performance before remediation for the three runs of the course. Once again the reader will note the improvement in course performance effected by each revision cycle, such that the mean performance increased by 8 and 6% respectively with each run, from 78% to 86% to 92%. In addition, it can be noted that in terms of overall mean performance there were only ten segments that showed a mean below 90%.

Time data across the three runs are reported in Table 14. The figures in the first and second runs represent the number of minutes spent on instructional materials as well as taking the progress check and performing remediation as needed. The time data for the third run are thus inflated by approximately ten minutes additional to take the progress check and remediate. When the mean time figure from the third run is made comparable to the time expenditures from the first two runs (by subtracting ten minutes from the average of 49 minutes), it is apparent that the average amount of time per segment that the student invests in the course is lowest on the third run, while performance is highest on the third run, indeed, a very desirable combination.

TABLE 13

Segment Progress Check Performance Across Three Implementations
Mean Percentage Correct, Before Remediation

Segment Number	First Run	Second Run	Third Run	Segment Number	First Run	Second Run	Third Run
1.1	82	87	91	6.1	80	90	91
1.2	67	84	87	6.2	82	85	93
2.1	78	88	91	6.3	91	88	92
2.2	68	86	90	6.4	87	87	95
2.3	65	70	85	7.1	69	81	91
2.4	71	78	87	7.2	83	87	97
2.5	65	90	94	7.3	77	80	91
2.6	71	82	86	7.4	78	78	91
2.7	63	72	81	7.5	74	83	95
2.8	89	86	91	8.1	82	87	92
2.9	65	90	91	8.2	81	91	93
3.1	66	73	84	8.3	92	92	96
3.2	66	80	88	8.4	76	94	95
3.3	75	70	95	8.5	77	87	93
3.4	79	87	88	8.6	77	87	94
3.5	84	93	93	9.1	80	91	94
4.1	83	92	96	9.2	88	91	95
4.2	85	95	97	10.1	93	95	95
4.3	87	84	92	10.2	89	91	95
4.4	92	95	96	11.1	80	82	93
4.5	82	95	94	11.2	91	93	97
4.6	73	90	93	11.3	83	90	92
4.7	77	90	93	12.1	87	93	97
5.1	78	89	88	12.2	85	82	94
5.2	70	76	85	12.3	94	93	96
5.3	74	92	93	12.4	85	83	94
5.4	69	84	90				
5.5	59	82	94				
5.6	70	82	92				
5.7	80	83	95				
5.8	90	90	93	MEAN-ALL SEGMENTS	78	86	92
5.9	78	79	90				
5.10	66	90	94				

Table 14

Mean Time by Segment Across Three Implementations

Segment Number	Mean Time (No Minutes)		
	First Run	Second Run	Third Run
1.1	92	90	106
1.2	30	48	56
2.1	37	51	53
2.2	31	48	61
2.3	31	76	57
2.4	25	49	51
2.5	26	58	52
2.6	35	68	68
2.7	30	60	67
2.8	34	60	62
2.9	55	52	48
3.1	37	50	42
3.2	25	43	42
3.3	32	48	41
3.4	27	50	44
3.5	34	47	44
4.1	39	61	65
4.2	43	52	41
4.3	41	52	60
4.4	56	67	63
4.5	50	59	53
4.6	41	50	49
4.7	43	48	41
5.1	57	55	52
5.2	59	57	51
5.3	39	41	48
5.4	51	56	51
5.5	52	46	50
5.6	40	40	35
5.7	31	29	38
5.8	39	39	37
5.9	55	54	44
5.10	35	34	32

Table 14 (Continued)

Segment Number	Mean Time (No Minutes)		
	First Run	Second Run	Third Run
6.1	48	67	57
6.2	47	63	53
6.3	45	60	49
6.4	41	44	29
7.1	36	41	41
7.2	42	46	44
7.3	38	38	28
7.4	42	45	41
7.5	39	39	34
8.1	59	64	72
8.2	60	66	63
8.3	52	57	60
8.4	63	44	41
8.5	55	50	47
8.6	56	50	40
9.1	42	42	35
9.2	40	42	37
10.1	52	61	56
10.2	45	50	48
11.1	31	42	38
11.2	30	26	31
11.3	34	46	43
12.1	68	53	60
12.2	71	61	64
12.3	38	36	48
12.4	41	42	54
MEAN	44	51	49

NOTE: Data for the first and second run exclude time spent on taking the progress check and performing remediation. This extra time expenditure of approximately 10 minutes is included in the time data for the third run.

It should be pointed out here that differences in segment performance can be attributed to a multitude of factors such as differences in content, test items, media and presentation forms and the personnel who developed the materials. Thus when differences in segment performance arise, the difficulty lies in determining the causative factors. The one factor which may most easily be isolated is that of the medium employed. To obtain some estimate of the influence the medium itself has on segment performance, one may average the results for material developed in each medium and contrast the averages. This has been done in Table 15.

One important qualification must be made in interpreting the results in Table 15. Although the materials have been grouped on the basis of media, the results should not be construed as evidence of the superiority or inferiority of one medium vis a vis another. These results do not reflect inherent qualities of the media as such, but are rather indications of the effectiveness of the materials which were developed for and presented in each medium. The reason for grouping and reporting results by media is to localize the variations in effectiveness of materials which may be attributable to teaching via different media. The results do not indicate comparisons of media made over identical content with identical test items, developed by the same writer, and employing identical presentation variables.

Table 15

Progress Check Mean Performance (Before Remediation) Across All Materials Developed in Each Medium, Second and Third Implementations

Media	Second Run	Third Run
CAI Script/IPB	87	96
Audiotape Script/IPB	93	95
CAI	88	94
Audiotape/IPB	93	94
Linear Text	88	94
Syndactic Text	87	92
Audiotape/Panelbook	82	89

The data for the third run in Table 2 was tabulated from the breakdown for media by segment given in Table 13. The breakdown within a segment in Table 13 indicates segments where a media option was available as was shown in Figure 2 (page 108).

It can be noted that the mean performance within each medium increased from the 2nd to the 3rd run, and that performance is quite comparable across all media in the final installation run.

Table 16

Mean Progress Check Performance (Before Remediation) For Media By Segment for the Third Run

Audiotape/Panelbook (AT/PB), Syndactic Text (ST)

Segment Number	Total Segment Performance	AT/PB	ST
2.2	90	91	90
2.3	85	84	85
2.4	87	88	87
2.5	94	91	95
Mean (2.2-2.5)	89	89	89
3.1	84	82	84
3.2	88	82	89
3.3	95	92	96
3.4	88	79	89
Mean (3.1-3.4)	89	84	89
5.7	95	85	96
5.8	93	93	92
5.9	90	88	90
5.10	94	95	94
Mean (5.7-5.10)	93	90	93
7.1	91	87	91
7.2	97	93	98
7.3	91	91	91
7.4	91	88	91
7.5	95	92	95
Mean (7.1-7.5)	93	90	93

Table 16 (Continued)

Segment Number	Total Segment Performance	AT/PB	ST
9.1	94	94	94
9.2	95	92	96
Mean (9.1-9.2)	95	93	95

Mean for all AT/PB = 89

Mean for all ST = 92

Syndactic Text

Segment No.	Segment Performance
1.1	91
2.1	91
2.6	86
2.7	81
2.8	91
2.9	91
3.5	93
5.1	88
5.2	85
5.3	93
6.1	91
6.2	93
6.3	92
6.4	95
8.4	95
8.5	93
8.6	94
11.1	93
11.2	97
11.3	92
Mean	91

Table 16 (Continued)

Audiotape/Intrinsically Programed Booklet (AT/IPB)
Audiotape Script/Intrinsically Programed Booklet (ATS/IPB)

Segment Number	Total Segment Performance	AT/IPB	ATS/IPB
4.4	96	95	96
4.5	94	93	95
4.6	93	93	93
4.7	93	91	94
Mean (4.4-4.7)	94	93	94
10.1	95	96	95
10.2	95	93	95
Mean (10.1-10.2)	95	95	95

Mean for all AT/IPB = 94

Mean for all ATS/IPB = 95

Computer Assisted Instruction (CAI)
CAI Script/Intrinsically Programed Booklet (CAIS/IPB)

Segment Number	Total Segment Performance	CAI	CAIS/IPB
12.1	97	96	97
12.2	94	95	94
12.3	96	94	97
12.4	94	92	95
Mean	95	94	96

Mean for all CAI = 94

Mean for all CAIS/IPB = 96

Table 16 (Continued)

Linear Text

Segment No.	Total Segment Performance
4.1	96
4.2	97
4.3	92
5.4	90
5.5	94
5.6	92
8.1	92
8.2	93
8.3	96

Mean for all Linear Texts = 94

Student Attitude and Conclusions

The following pages are devoted to student attitude data as collected from the final installed course system. The actual questionnaire is shown in Table 17. The succeeding tables, summarizing the results, are almost self-evident and require little explanation to show that the final course system was well received by the students. This data on student attitude towards the course, in conjunction with performance data shown on previous pages proves that the processes employed to build the course yielded a valuable product, as well as a viable model.

TABLE 17

STUDENT QUESTIONNAIRE

1. Volume number? __________

For the following questions circle the appropriate number.

	High 1	Above Avg 2	Avg 3	Below Avg 4	Low 5
2. Was the material interesting?					
3. Was the material difficult?	1	2	3	4	5
4. Rate your approval of the way the material was presented (check only the media used in this Volume).					
a. Audiotape/Intrinsically Programed Booklet (IPB)	1	2	3	4	5
b. Audiotape Script/IPB	1	2	3	4	5
c. Audiotape/Panelbook	1	2	3	4	5
d. Computer Assisted Instruction (CAI)	1	2	3	4	5
e. CAI Script/IPB	1	2	3	4	5
f. Discussion Booklet	1	2	3	4	5
g. Linear Text	1	2	3	4	5
h. Syndactic Text	1	2	3	4	5

5. If your answer to number 4 was "Below Avg." or "Low," identify the media and indicate why.

6. Have you had any difficulties with regard to:

	Yes	No
a. Maintaining the minimum pace as indicated in the Course Activities Chart?		
b. Following procedures as outlined in the Student Guide?		
c. Obtaining instructional materials?		
d. Meeting with the instructor?		

7. If you answered "Yes" to any portion of number 6, please specify the area and the problem.

8. If you have any additional comments to make with regard to the above questions or any other aspect of the course, please do so here.

TABLE 18

STUDENT QUESTIONNAIRE DATA

Question #2: Was the material interesting?

Volume Number	Segment	Media	# of Stdts.	High	Above Average	Average	Below Average	Low
I	1.1/2	SYN	92	10.3	44.3	41.2	3.1	1.0
II-A	2.1-5	ATPB	30	16.7	36.7	40.0	-	3.0
II-ABC	2.1-9	SYN	60	7.9	46.0	46.0	-	-
II-D	2.6-9	SYN	91	27.5	49.5	20.9	2.2	-
III-A	3.1-5	ATPB	13	7.7	30.8	61.5	-	-
III-BCA	3.1-5	SYN	80	3.8	31.3	55.0	8.8	-
IV-A	4.1-4	LPI	40	5.0	32.5	52.5	7.5	2.5
IV-B Tape	4.5-7	ATIPB	26	7.6	23.0	65.3	-	3.8
IV-B Script	4.5-7	ATIPB	61	16.3	36.0	44.2	1.6	-
V-A	5.1-6	SYN	92	5.3	21.5	54.8	15.0	3.2
V-B	5.7-10	ATPB	11	-	27.2	45.4	-	27.2
V-C	5.7-10	SYN	83	-	12.0	78.3	8.4	9.6
VI-AB	6.1-4	LPI	91	3.2	28.2	61.9	3.2	3.2
VII-A	7.1-5	ATPB	13	15.3	53.8	23.0	7.6	-
VII-BC	7.1-5	SYN	78	6.0	31.3	57.8	4.8	-
VIII-A	8.1-3	LPI	91	6.6	24.4	56.6	7.7	3.3
VIII-B	8.4-6	SYN	87	4.6	37.9	54.0	3.4	-
IX-A	9.1/2	ATPB	5	-	100	-	-	-
IX-B	9.1/2	SYN	86	3.5	34.5	59.5	1.1	1.1
X Tape	10.1/2	ATIPB	11	9.0	45.4	45.4	-	-
X Script	10.1/2	ATIPB	75	2.6	29.3	64.0	2.6	1.3
XI	11.1-3	SYN	87	4.6	37.9	49.4	8.0	-
XII	12.1-4	CAI/IPB	55	11.0	25.0	55.7	7.6	-
XII	12.1-4	CAI	27	39.1	39.1	17.3	4.3	-

TABLE 19

STUDENT QUESTIONNAIRE DATA

Question #3: Was the material difficult?

Volume Number	Segment	Media	# of Stdts.	High	Above Average	Average	Below Average	Low
I	1.1/2	SYN	92	-	10.2	62.2	22.4	5.1
II-A	2.1-5	ATPB	30	-	6.7	83.3	6.7	-
II-ABC	2.1-9	SYN	60	1.6	14.3	74.6	9.5	-
II-D	2.6-9	SYN	91	7.7	39.6	49.5	3.3	-
III-A	3.1-5	ATPB	13	-	-	92.3	7.7	-
III-BCA	3.1-5	SYN	80	1.3	16.3	77.5	3.8	-
IV-A	4.1-4	LPI	40	5.0	5.0	62.5	17.5	7.5
IV-B Tape	4.5-7	ATIPB	26	-	7.6	73.0	11.6	7.6
IV-B Script	4.5-7	ATIPB	61	1.6	11.3	80.3	6.4	-
V-A	5.1-6	SYN	92	4.3	18.2	68.8	7.5	-
V-B	5.7-10	ATPB	11	-	18.1	54.5	27.2	-
V-C	5.7-10	SYN	83	-	7.0	78.8	14.1	-
VI-AB	6.1-4	LPI	91	1.0	10.8	82.6	5.4	-
VII-A	7.1-5	ATPB	13	-	30.7	69.2	-	-
VII-BC	7.1-5	SYN	78	-	9.8	82.7	7.4	-
VIII-A	8.1-3	LPI	91	2.2	13.3	76.6	7.7	-
VIII-B	8.4-6	SYN	87	-	5.7	78.1	14.9	1.1
IX-A	9.1/2	ATPB	5	-	20.0	20.0	60.0	-
IX-B	9.1/2	SYN	86	1.1	8.3	61.9	11.9	1.1
X Tape	10.1/2	ATIPB	11	-	27.2	72.7	-	-
X Script	10.1/2	ATIPB	75	6.0	7.6	76.9	11.4	2.5
XI	11.1-3	SYN	87	1.1	8.0	82.7	8.0	-
XII	12.1-4	CAI/IPB	55	-	9.6	82.6	5.7	1.9
XII	12.1-4	CAI	27	-	32.1	64.2	3.5	-

TABLE 20

STUDENT QUESTIONNAIRE DATA

Question #4: Rate your approval of the way the material was presented.

Volume Number	Segment	Media	# of Stdts.	High	Above Average	Average	Below Average	Low
I	1.1/2	SYN	92	15.5	53.6	23.7	4.1	-
II-A	2.1-5	ATPB	30	6.7	3.3	10.0	-	-
II-ABC	2.1-9	SYN	60	14.3	49.2	33.3	3.2	-
II-D	2.6-9	SYN	91	12.1	46.2	35.2	6.6	-
III-A	3.1-5	ATPB	13	7.7	15.4	23.1	-	-
III-BCA	3.1-5	SYN	80	5.0	36.3	57.5	1.3	-
IV-A	4.1-4	LPI	40	12.5	17.5	55.0	2.5	12.5
IV-B Tape	4.5-7	ATIPB	26	11.6	19.2	50.0	11.6	7.6
IV-B Script	4.5-7	ATIPB	61	9.6	16.3	55.7	11.3	6.4
V-A	5.1-6	SYN	92	6.8	28.7	62.0	2.2	-
V-B	5.7-10	ATPB	11	18.1	72.7	27.2	-	-
V-C	5.7-10	SYN	83	6.2	37.5	61.6	1.2	-
VI-AB	6.1-4	LPI	91	6.5	28.5	62.6	1.0	1.0
VII-A	7.1-5	ATPB	13	7.6	53.8	30.7	7.6	-
VII-BC	7.1-5	SYN	78	6.1	29.6	60.4	2.4	1.2
VIII-A	8.1-3	LPI	91	1.1	18.8	63.3	6.6	8.8
VIII-B	8.4-6	SYN	87	8.0	35.6	56.3	-	-
IX-A	9.1/2	ATPB	5	-	80.0	20.0	-	-
IX-B	9.1/2	SYN	86	6.8	38.6	54.6	-	-
X Tape	10.1/2	ATIPB	11	9.0	9.0	63.6	9.0	9.0
X Script	10.1/2	ATIPB	75	1.3	19.6	57.8	10.5	10.5
XI	11.1-3	SYN	87	8.0	32.1	59.7	-	-
XII	12.1-4	CAI/IPB	55	3.8	5.6	71.6	16.7	1.8
XII	12.1-4	CAI	27	55.1	31.0	13.7	-	-

TABLE 21

STUDENT QUESTIONNAIRE DATA

Question #6a: Have you had any difficulties with regard to maintaining the minimum pace as indicated in the Course Activities Chart?

Part	Yes	No
I-V	23.0	78.0
VI-XII	3.0	90.8

This chapter has attempted to summarize the sequence of steps which brought the media selection model from its conception to its final realization in the final course product. Its placement within the model is not entirely accurate, that is, while the basic design was one of the inital tasks of the project, quite obviously, the fabrication and production of materials (the subject of chapter 5, immediately following) had to occur before any testing of the model was possible. Nonetheless, it seemed wise to utilize one chapter of this report for a comprehensive detailing of those steps with their appropriate examples which yielded the final course products.

It is somewhat unfortunate that space is not available to include in even greater detail the many considerations, discussions, and "agonizing reappraisals" which centered on the problems of instructional design. Anyone interested in more details may refer to Part I of this Final Report, TR 6.18, or the appropriate documents listed in Appendix A.

The costs involved in currently maintaining the course or in administrative overhead are essentially negligible. As reported in TR 6.17, Management Design, a Course Administrator can function as the interface between the students and one or more instructors per hundred students. The function of the Course Administrator, located in facilities similar to those described in Figures 16 and 17, provides all clerical capabilities for course administration, thus freeing the instructor for the more suitable task of instruction in whatever manner he sees fit.

V. DEVELOPMENT AND PRODUCTION OF INSTRUCTIONAL MATERIALS

Abstract

This section summarizes the various competencies required for product development, the specifications for insuring uniform development activity in an R & D construct, and the management of the production effort.

V.. DEVELOPMENT AND PRODUCTION OF INSTRUCTIONAL MATERIALS

This section will not attempt to detail all the procedures that are necessary for developing self-paced individualized instructional materials but will outline some of the relevant steps as they pertain to this model.

Specifically, this chapter should specify those procedures that were employed which related to the specific tasks of creating materials that would be useful for research purposes as well as fulfilling the requirements for course instruction. As such, it will concentrate on the requirements of the research model, levels and types of personnel, and scheduling procedures for contractual obligations.

Personnel and Competencies

Since materials development was the primary visible product of the project, it can be said that everyone wrote. There was virtually no administrative overhead - that is, every project member made direct contributions to the writing of instructional materials. Even the managers, nominally reviewers only, provided input as subject matter experts with pertinent examples, or otherwise employing their specialized knowledge for some particular area of an instructional package. However, the bulk of the development effort to prepare the instructional materials was the responsibility of the writers and editors. In the selection of personnel to be hired for these tasks, the decision was made that the project could not afford to be a training ground for potential writers. Thus, all writers and editors were required to not only have previous background in educational technology and programmed instructional writing, but were screened by an examination which was devised to insure competencies in these areas. A copy of the test is included in Appendix J.

In addition to an initial demonstration of competencies, the project personnel developed a range of abilities which evolved from their working with the various course products. Toward the end of the project, there was an effort to isolate those skills and competencies in a joint effort of Westinghouse Learning Corporation with a research team from Teaching Research, a division of the Oregon State System of Higher Education. A detailed statement of requisite skills for the various products were compiled by interviews with persons responsible for those products. The following list is a composite of those competencies which were elicited from the writers.

Other competencies which relate to other professional tasks, such as design of research and evaluation plans, instructional design, and course models, are compiled in Appendix K.

CONTENT OUTLINES

Product Tasks:

Work with context analysis and writers to clarify course content
Determine final format of content outline
Relate all objectives to former course areas
Decide on new weighting of parts--which areas should be expanded, which contracted
Build content outline by topic which will work in the whole part traditional earlier course
Assemble parts of content outline into booklet form
Type content outline in standard format
Remove redundant material from content outline
Re-arrange material within content outline
Revise content outline based on comments from implementations supervisor and subjective opinion
Submit content outline to review for recommended changes
Correlate/correspond content outline with course materials
Insure same verbiage between content outline and materials
Add/delete examples where necessary.
Determine parts that must be retyped or where can cut and paste
Review for mechanical errors
Revise content outline based on current needs and changes
Study outline and suggest deletions and changes
Delete nonessential material from content outline
Compare subcontractors recommendations against original list of items on contract outline
Check to see if course outline includes all parts felt necessary
Negotiate with (sponsor) for acceptance of each part (This has never stopped--still going on)
Work toward concurrance/non-concurrance on recommended changes
Assign writers tasks - corresponding/correlating content outline with course materials - based upon revisions
Determine amount of time it would take a writer to review correspond/correlate content outline with course materials
Determine a production schedule
Interact with consultant about writing outline
Submit content outline and recommended changes or modifications to implementation supervisor for review/approval
Provide writers with clarification in relation to corresponding content outline and course material
Double check writers work against revision specifications to see that specified changes were made as required

Apply for criteria: clear, concise, complete, correct, to revision process
Ask other members of the staff for their judgment on technical topics
Ask sponsor to resolve conflict over quality issues
Negotiate with (sponsor) for emphasis, agreement on weighting of subjects of course
Discuss in conferences the performance of staff, i. e., the writers

Product Enablers:

Knowledge of what midshipmen already know
Knowledge of military circumstances through experience
Knowledge through experience of midshipmen's life
Knowledge of programmed instruction, principles and techniques
Awareness of (sponsor) standards and context
Knowledge of traditional previous course content
Knowledge of (context), methods and experiences
Knowledge of mechanisms/operations (within content) to make recommendations on the content outline
Knowledge of multimedia/mode used with a particular segment (knowledge of what syndactic, linear texts, etc. are)
Ability to write programmed frames of instruction
Ability to proof read for mechanical error
Ability to proof read for consistency
Thoroughness in work - ability to be thorough
Ability to plan work - in terms of time and space
Skill in writing clarity, etc.
Ability to work with sponsor personnel in negotiating content of course outline and changes, etc.
Ability to persevere in determining (sponsor's) desires thru negotiating
Skill in determining what is non-essential in content outline
Previous experience with content materials - helpful
Sensitivity/awareness of end-use of the product - used at Academy by second class midshipmen
Sensitivity to the content (user agency) - related to the above sensitivity
Awareness of the effect of changes on the rest of the materials
Awareness of the interrelationships of the materials
Appreciation for time and what can be done in a time segment
Awareness of personalities of staff you are working with
Awareness of staff capabilities in relation to the job
Awareness of the nature of the product and the steps/pieces involved in producing that product

TERMINAL OBJECTIVES

Product Tasks:

Analyze former course for areas of learning it covers, results it expects
Write objectives for each section working from new mediated course content
Negotiate each objective with user for acceptance
Build one terminal objective per major subdivision of every content outline
Revise objectives on basis of added/deleted materials in content outline
Delete objectives on basis of revised content outline

Production Enablers:

Knowledge of course content in terms of what/where material covered
Knowledge of what user wants taught
Knowledge of purpose of terminal objectives enabling objectives
Skill in writing objectives
Skill at negotiating acceptance or modification of each terminal objective with user
Ability to use diplomacy in working with writers
Ability to correlate material with terminal objective
Ability to read carefully - to see that the objectives and material correlate and correspond
Sensitivity to the interrelationships in deriving enabling objectives from terminal objectives

ENABLING OBJECTIVES

Product Tasks:

Build enabling objectives from course content outline
Work with writers on developing enabling objectives for each terminal objective

Product Enablers:

Knowledge of what (sponsor) wants
Knowledge of purpose of terminal objectives, enabling objectives
Skill in writing objectives
Skill at negotiating acceptance or modification of objectives for each section with (sponsor)
Skill in diplomacy in working with writers
Skill in [illegible] interrelationships in deriving enabling objectives from terminal objectives

SYNDACTIC TEXT MODULES

Product Tasks:

List the topics to be covered in text unit
Read material (primarily texts) in the office - in relation to the subject matter of a particular syndactic text (literature review)
Collect textbook material to read/review relative to content
Consider level of material in terms of audience (midshipmen)
Determine which material (from textbook review) will be used to support a particular point relative to subject matter
Specify and/or create graphic materials to be included in syndactic texts
Number the topics in sequence of presentation
Correlate content outline with material for syndactic text -
Determine number of summaries to be included within each syndactic text - there are major parts/sections of the text
Establish guidelines/steps to follow in writing a syndactic text format
Use progress checks as a reference in writing material
Think of original/sensible ways of presenting and testing information/content
Write pre-quiz items to cover basic points in the syndactic text
Write summary/overview part of the text
Write frames - an expansion and check of points covered in original summary
Scramble/rearrange postquiz items and answers - same as prequiz items after summary
Obtain the master material to be summarized
Obtain the terminal objective for this unit
Rewrite the topic titles to fit into space required
Write new summary of segment which needs revising accommodating criticisms of information
Write new linear frames to go with summary
Write new summary quiz to match new summary in content
Produce the interview form for interviewing midshipmen
Type material for camera copy readiness
Interview midshipmen about effect of product
Use an interview form during the interview of the midshipmen
Utilize revision related comments from the user agency as to major points to cover in syndactic text
Modify content outline on basis of readings (literature review relative to syndactic text)
Review syndactic text in relation to content outline to make sure every point in the outline has been treated/acknowledged

Check to see that progress checks correspond until material is actually taught
Check that terminal objectives and enabling objectives for the segment were covered
Edit entire text of segment for more types
Improve phraseology throughout entire segment of course
Read the segment which has been sent back for revision as it stands, and read comments which indicated need for revision
Check product against criteria
Prepare recommendations for modification
Make recommendations for changes in instructional material
Proof read material - typists/production/writers/editor
Modify/incorporate recommended changes from user agency and editor
Discuss instructional examples until subject matter expert for correspondence with reality of military experience
Send over pieces of the text for the user agency to review and make suggestions and/or corrections
Review materials sent by the contractor to the user
Assist other writers in writing a syndactic text
Interact with sponsor as to nature of the material in syndactic text
Provide all writers with a set of format guidelines
Hold committee meeting to review depth, core materials (those so specific it required more specific expertise

Product Enablers:

Knowledge of content outline so that proper objectives are covered in revised form
Knowledge of function of TO's and EO's (terminal objective-enabling objective)
Knowledge of syndactic course structure
Knowledge of leadership course content
Knowledge of the media being used for each section
Knowledge of jargon used by midshipmen
Knowledge of military practices and terms used
Knowledge of who to ask if knowledge not in head
Ability to write concisely
Knowledge of objectives in course and specific unit
Knowledge of contents of course and specific unit
Knowledge of rudiments of writing (instructional materials)
Knowledge of Navy jargon
Superficial/introductory knowledge of content area of syndactic text
Knowledge of how to write test items - primarily multiple choice type items
Ability to write a paragraph - related to the summary
Skill in ways of presenting and testing material - frame writing styles

Ability to work with data - read data sheets to pin point test items that might need revision
Ability to specify graphic illustrations/charts to a accompany text
Ability to draw the illustrations.figures to accompany text
Ability to type
Ability to look at index and determine where most useful information relative to a particular topic would be found in the publication
Ability to maintain a continuity or flow in the sequence of frames that are written in a syndactic text
Ability to logically approach a subject or topic
Skill in writing
Ability to be persistent and painstaking in reviewing materials
Experience in teaching subject matter
Ability in writing in order to write readable examples, portions of text
Sensitivity to the specific characteristics of target students
Sensitivity to needs of students beyond class circumstances
Sensitivity in the balance in writing a paragraph - points in paragraph as specified by topic sentence - have covered

VIDEOTAPE MODULES

Product Tasks:

Determine where training aids (visuals) might be needed in conjunction with the presentation
Suggest corrections in videotape in both format and content
Suggest changes in verbal script
Edit scripts for accuracy
Remake video visuals for different (3) response mode (as against the 20 response mode)
Make sure equipment hardware and software are compatible
Plan content to suit medium in interesting manner
Write/prepare script
Make copy of first script for approval
Transfer script to teleprompter
Organize hundreds of slides for visuals (and panelbooks)
Transfer video visuals to 35 mm slides
Duplicate video visuals for panelbook (for audiotape)
Prepare visuals for appropriate superimposition
Select reader - someone who knows or is professional reader
Hiring of subcontractors to care for direction production
Purchase video tape

Hiring of talent for performing lecture material
Select talent personality to suit intended presentation realistically
Contract local commercial TV station to use facilities
Contract another facility to transfer to 1 inch video tape
Record the video tape
Edit video tapes for errors of commission and demission
Detect errors in video tape - both technical and in terms of jargon
Provide comments as to quality of video tapes
Insure that script was followed by the speaker who was cutting the tape
Edit video tapes
Edit errors, electronically, as made
Rewrite many scripts for better video contact with viewer
Eliminate unnecessary big words - be concise
Get tapes duplicated

Product Enablers:

Knowledge of audio-visual hardware for media
Knowledge of production techniques relevant to individual media
Knowledge of audio and print writing technique
Knowledge of capabilities and limitations of video as electronic medium
Knowledge of how to run video tape machine
Knowledge of user relevant terminology
Knowledge of user procedures and policy
Ability in designing and coordinating video and visual elements of presentations
Coordinating all the people involved at one time or in sequence
Ability to read as if he knows material (narrator)
Ability to adapt script, etc., to each medium
Ability to fit everything into scope of medium being used
Ability to make creative decisions
Ability to write for both audio and print
Use of concise, simple language - not educationese

AUDIOTAPE MODULES

Product Tasks:

Transfer sound track from video to audiotape
Develop scripts complete with instructions to reader re: pausing, emphasis, etc.
Get panel book made up to correspond with video visuals
Duplicate tapes in house

Product Enablers:

- Knowledge of audio-visual hardware for media
- Knowledge of production techniques relevant to individual parts
- Knowledge of audio and print writing technique
- Ability to read as if he knows material (narrator)
- Ability to adapt script, etc., to each medium
- Ability to fit everything into scope of medium being used
- Ability to make creative decisions
- Ability to write both for audio and print
- Use concise, simple language - not educationese

COMPUTER AIDED INSTRUCTION (CAI) MODULES

Product Tasks

- Duplicate material for use on other media, as comparison and to replace
- Deleted some irrelevant materials from instructional program

Product Enablers:

Educational technology as taught by Skinner, et. al.

LINEAR PROGRAMED MODULES

Product Tasks:

Review reference materials - textbooks relative to content material of the texts
Correlate content outline with materials in the linear texts
Incorporate material from references into writing of the frames
Select examples, usually user relevant, to support material
Write/create frames
Confer with subject matter experts as to appropriateness of examples to be included in the linear texts
Provide implementations, supervise alternative ways of expressing a particular point in the material
Follow directives from the user agency for specifications in revision of the materials
Participate in decision of final format/style - input and information
Interact with implementation supervisor for further clarity/specifications in revising linear materials
Type material in camera-ready form
Rewrite frames--content within linear text
Add and/or delete frames
Revise style of frames--bring paragraphs together; rearrange order of frames, add examples
Review/proof-read final materials of linear text
Revise sentence-structure/grammar--does not change the meaning

Product Enablers:

Ability to revise frames relative to feedback from testing
Ability to write a frame
Skill of tact - particularly in dealing with the user agency
Ability to persuade or convince or your viewpoint

INTRINSICALLY PROGRAMED MODULES

Product Tasks:

Test material with sampling of three to five students at contractor site
Edit, revise, "patch" copy in rush to meet deadline
Apply references from faculty and subject matter to experts for revision of textual content

Rewrite sections based on deficient student (statistically) performance
Patch "errors" shown by students making incorrect responses
Retype copy marked up for sending to printers
Bind and staple copies of programed texts
Textual specifications given and explained to subcontractor
Examine and critique text (copy received from subcontractor)
Decide to redesign sequencing for programed text
Prepare schematic for producing modified instructional sequencing that meets standards of programing
Train other writers to produce optimally programed intrinsic programed texts

Product Enablers:

Knowledge of "process of Preparing Valid Effective Learning"
Knowledge of good programing frames from bad frames
Ability in writing suitable sequences for intrinsic programed learning
Skill in interpreting "Preparing Valid Effective Learning"
Ability in producing schematics for scrambling programed sequences
Experience as military instructor
Ability to avoid contradictions or apparent contradictions in written material
Ability to think like a student

Developmental Guidelines

There was no single handbook which compiled all specifications for the developers of instructional materials. There were, however, some documents which provided guidelines to the developers which are included in the appendix. The document in Appendix L represents one type. It is a brief summary of programmed writing procedures as they pertained to the specific products under development.

The second document is the Manual of Style, a portion of which is shown in Appendix M. A third input to the writers which provided guidelines for the research activities was found in two documents, TR 6.3a, titled _Research and Evaluation Plans_, and TR 6.4a, _Instructional Presentation Design_. These two documents specified which segments and modules of instruction would be developed with varying presentation characteristics. An extract of the presentation design is shown in Figure 12 in Chapter 4, page 162. In capsule format, it presents the variety of presentation forms and the specifications for each learning module. A detailed explanation of the meaning and rationale for each presentation is presented in Part I of the final report, TR 6.18, Summary and Conclusions Relating to Research and Evaluation of a Multi-Media Instructional System. An extract from TR 6.3a, which provided more specific guidelines to the writers is presented in Appendix N.

Guidelines for content were the Content Outline, and Terminal and Enabling Objectives, samples of which are shown in Appendix O. Further guidelines for content were the various source materials or bibliography which provided an input for the original definition of the Content Outline. A sample of the bibliography used is presented in Appendix P.

All these guidelines combined to give the instructional writers and editors specific and detailed specifications for their development work.

Management of Development and Production

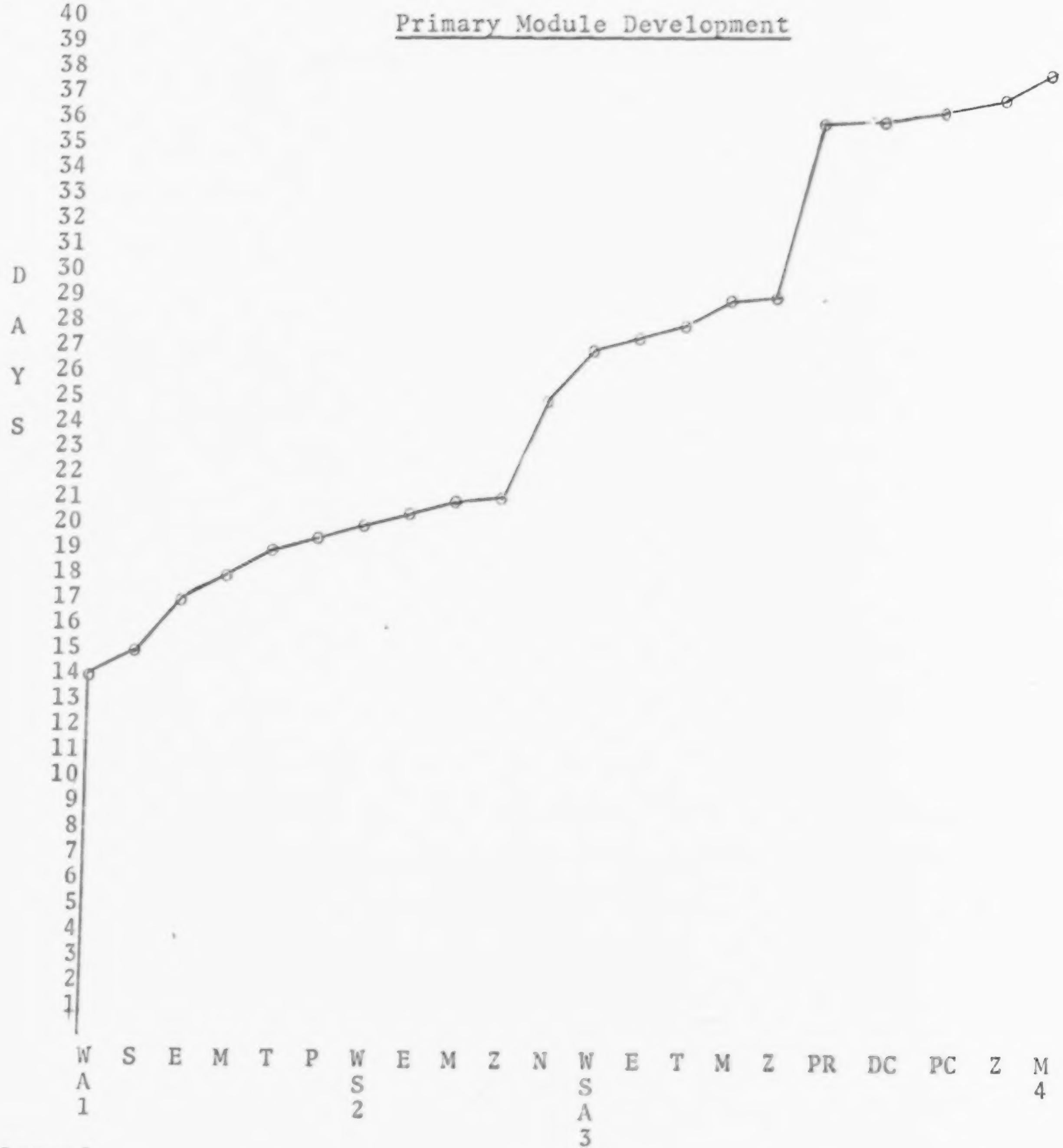
Since the development effort would require the drafting, writing, and production of over two hundred original modules of instruction, the problems of control and scheduling were exceedingly complex. The basic procedure for each module of instruction was to generate the primary module which contained the basic instructional content. On approval of that content, the subsidiary modules incorporating the variations on presentation design characteristics were then generated. Figure 18 represents the development effort of the primary module of instruction. It is a matrix showing the time sequence of each stage in the development effort prior to submittal.

Another example of the control procedures is shown in Figure 19, which indicates the various stages of development and production and the use of the MS (manuscript) control jacket which contained all pertinent data on each manuscript in addition to the draft as it moved through several departments.

A sample of the delivery schedule is shown in Table 22, for the sixty segments of instruction as in all subsidiary modules. It is offered here to show the complexity of the schedule required to maintain smooth operations.

FIGURE 18

Primary Module Development



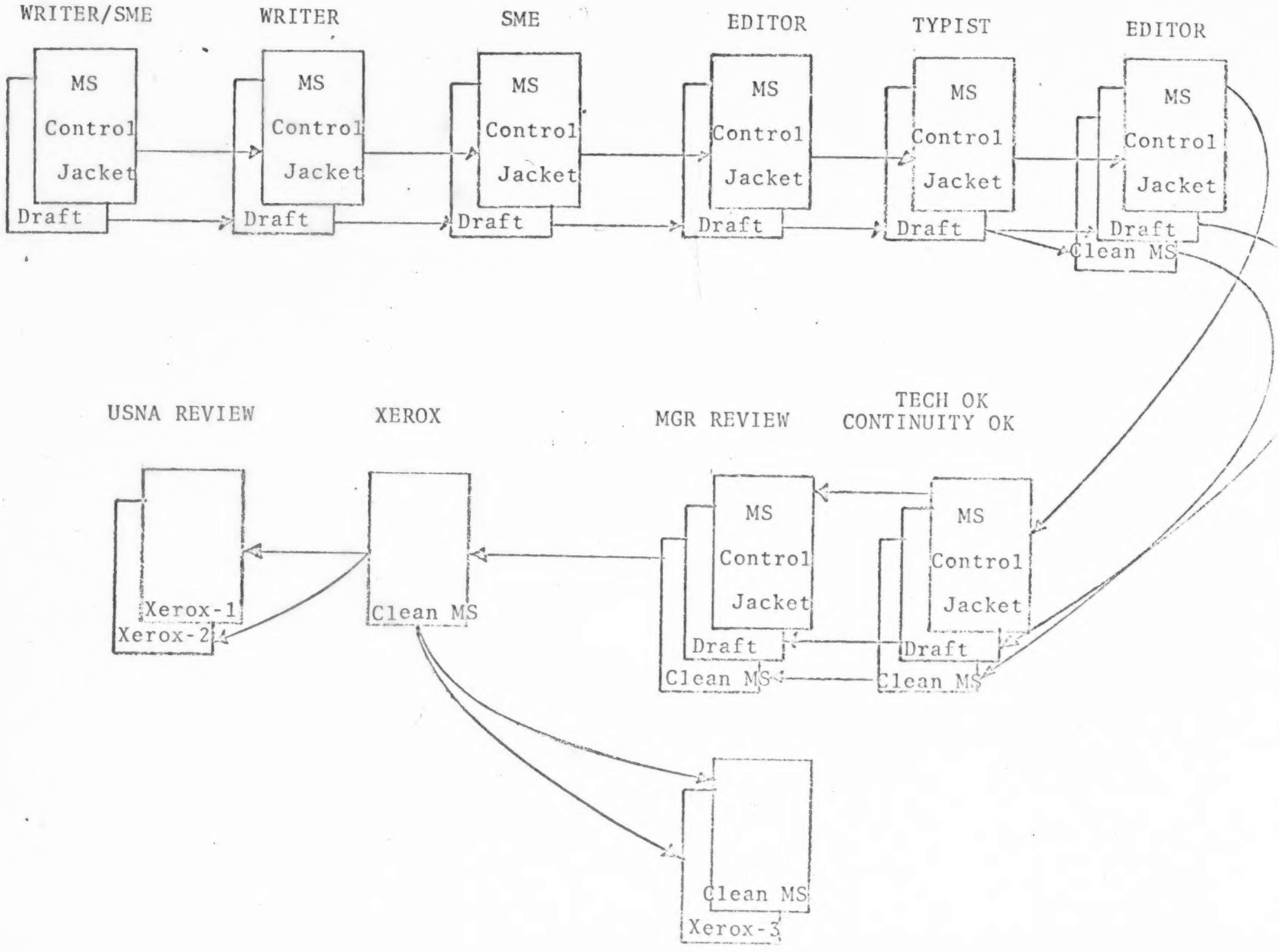
Legend

W	Writer	N	Navy Review
S	SME Review	Z	Zerox
E	Editor	PR	Printer
M	Management	DC	Document Controller
T	Typing	PC	Page Checker
P	Proof Reader	A	Artist

1 Writer w/ artist & SME must produce a smooth-rough of text 2 Writer/SME review of smooth text 3 Writer/artist/SME review & make USNA recommended corrections 4 Final management quality control review prior to submission

FIGURE 19

COPY FLOW FOR PRIMARY AND SUBSIDIARY MODULES


WRITER/SME
MS
Control
Jacket
Draft
WRITER
MS
Control
Jacket
Draft
SME
MS
Control
Jacket
Draft
EDITOR
MS
Control
Jacket
Draft
TYPIST
MS
Control
Jacket
Draft
EDITOR
MS
Control
Jacket
Draft
Clean MS
USNA REVIEW
Xerox-1
Xerox-2
XEROX
Clean MS
MGR REVIEW
MS
Control
Jacket
Draft
Clean MS
TECH OK
CONTINUITY OK
MS
Control
Jacket
Draft
Clean MS
Clean MS
Xerox-3

DATE	Deliv. PRI MOD	Approv. PRI MOD	Deliv. SUB MOD	Approv. SUB MOD	Final Deliv. PRI	Final Deliv. SUB
5/11	1.1 1.0 2.1					
5/18	2.2	1.1 1.2 2.1				
5/25	2.3 2.4 5.1	2.2				
6/1	2.5	2.3 2.4 5.1				
6/8	2.6 3.1 5.2	2.5				
6/15	2.7 3.2 5.3	2.6 3.1 5.2	2.2			
6/22	3.3 4.1 5.4	2.7 3.2 5.3	2.3 2.4	2.2	1.1 1.2 2.1	
6/29	2.8 3.4 4.2	3.3 4.1 5.4	2.5	2.3 2.4	2.2	
7/7	2.9 3.5 5.5	2.8 3.4 4.2	2.6 3.1	2.5	2.3 2.4 5.1	
7/13	4.3 4.4 5.6	2.9 3.5 5.5	2.7 3.2	2.6 3.1	2.5	
7/20	4.5 5.7 6.1	4.3 4.4 5.6	3.3 4.1 5.4	2.7 3.2	2.6 3.1 5.2	2.2
7/27	4.6 5.8 6.2	4.5 5.7 6.1	2.8 3.4 4.2	3.3 4.1 5.4	2.7 3.2 5.3	2.3 2.4
8/3	5.9 6.3 6.1	4.6 5.8 6.2	5.5	2.8 3.4	3.3 4.1	2.5 3.1

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TABLE 22 cont.

DATE	[illegible] MOD	PRI MOD	SUB MOD	[illegible] MOD	ACTIV. PRI	ACTIV. SUB
8/10	4.7 5.10 6.4	12.2 5.9 6.3 8.1	4.3 4.4 5.6	5.5	2.8 3.4 4.2	2.6 31
8/17	8.2 8.3 8.4	4.7 5.10 6.4	4.5 5.7 6.1 12.1	4.3 4.4 5.6	2.9 3.5 5.5	2.7 3.2
8/24	7.1 8.5	8.2 8.3 8.4	4.6 5.8 6.2	4.5 5.7 6.1 12.1	4.3 4.4 5.6	3.3 4.1 5.4
8/31	7.2 8.6	7.1 8.5	5.9 6.3 8.1 12.2	4.6 5.8 6.2	4.5 5.7 6.1	2.8 3.4 4.2
9/8	7.3 7.4	7.2 8.6	4.7 5.10	5.9 6.3 8.1 12.2	4.6 5.8 6.2	5.5
9/14	7.5 9.1 12.3	7.3 7.4	8.2 8.3	4.7 5.10	5.9 6.3 8.1	4.3 4.4 5.6
9/21	9.2 10.1	7.5 9.1 12.3	7.1	8.2 8.3	4.7 5.10 6.4	4.5 5.7 6.1
9/28	10.2 11.1 12.4	9.2 10.1	7.2	7.1	8.2 8.3 8.4	4.6 5.8 6.2
10/5	11.2 11.3	10.2 11.1	7.3 7.4	7.2	7.1 8.5	5.9 6.3 8.1
10/12		11.2 11.3	12.3	7.3 7.4	7.2 8.6	4.7 5.10
10/19				12.3	7.3 7.4	8.2 8.3
10/26			11.1 12.4		7.5 9.1	7.1
11/2			11.2 11.3	11.1 12.4	9.2 10.1	7.2
11/9				11.2 11.3	10.2 11.1	7.3 7.4
11/16					11.2 11.3	
11/23						
11/30						11.1
12/7						11.2 11.3

General Considerations for Development and Production

Personnel requirements to achieve the goals for a large scale production effort are dependent upon two factors; the first is the amount of work to be done, the second is the time frame. If there are no deadlines to be met; that is, the material does not have to be ready for student use on a given day, then a handful of writers can produce any given quantity of materials. When deadlines have to be met, the staffing requirement is increased and the necessity for control and continuity becomes greater. It should be obvious from the schedules shown in Table 22, where finished products were delivered at the rate of two to four segments a week, that the manpower loading level was quite high.

As implied from the charts and figures presented in this chapter, there was a great effort made to insure continuity and uniformity of materials. All manuscripts received several reviews at varying levels. There was a great deal of interaction and discussion among all levels of the staff, and between the writers and subject matter experts. Thus, despite the fact that over twenty five writers were employed in the development effort, there is an amazing consistency of style, format, and quality.

This chapter has attempted to delineate both those competencies required for product development and the guidelines which allowed the writers to produce acceptable and well-performing materials for a variety of formats. Quite obviously, there were difficulties in producing such a large quantity along lines that such a project demanded. Generally, however, they were resolved through more attention to communication between various staff levels.

Anyone who undertakes product development oftentimes asks the question if it is more cost effective to produce materials in-house or to sub-contract to consultants or incorporated materials development groups. It was the experience of this contract that all development work had to be in-house products. In other words, although consultants in various subject matter disciplines were used to generate some of the materials to be used, it became necessary to maintain a large in-house staff for rewrite and editing. Thus, although drafts were prepared by the non-permanent staff, the responsibility for producing the final instructional material fell to a team of three in-house personnel - a writer, editor, and subject matter expert.

The importance of the operations discussed in this chapter again suggest the pressing need for extraordinarily competent personnel at both a technical, editorial, and management level.

VI. DEVELOPING AND VALIDATING TEST ITEMS

Abstract

This section details the procedures used to develop various test instruments for the course. It specifies the guidelines to the writers as well as the criteria employed for the revision of test items.

VI. DEVELOPING AND VALIDATING TEST ITEMS

Introduction

There were two types of test items developed for the multimedia Leadership course. One type was criterion referenced for evaluating and validating the instructional materials in their ability to bring the student to achieve the objectives of the course. The performance level for these objectives was set at 80/80 - that is, eighty percent of the students were to achieve 80% of the objectives using criterion referenced test items. The second type was the research test item which was developed to test the experimental hypotheses of the project. Since these hypotheses were aimed at establishing the effects of different instructional treatments rather than establishing proof of high criterion performance, they could be loosely classified as norm referenced test items. Hence the distribution of scores on these research tests would conform more to the bell shape curve, and not be clustered at a specific level, as with the criterion referenced items.

Criterion Referenced Items

Discussing development of criterion referenced test items can best be done by examining their relationship to the objectives for the course. The ideal objective, in stating the understanding or performance to be demonstrated, specifies the conditions of the behavioral measure. Hence the structure and some key components of the test item are created in the objective. Additionally, the sequencing and hierarchies of the collective objectives specify the types of learning that the criterion test items will evaluate. The type of learning, especially as it relates to other competencies, is not always explicit in the objective statement. Thus the criterion test item is dependent on the component specification of the objective for its structure, and is dependent the objective's placement in the hierarchy of objectives for an accurate interpretation of competencies along the scale of types of learning.

These observations are illustrated with the following examples from the writers specification used in this project. Assume that for purposes of uniformity, the various theoretical constructs of learning types were reduced to four: (1) Definition and Identification, (2) Discrimination and Comparison, (3) Generalization and Problem Identification, and (4) Problem Solving. Our goal was to set specification for both the statement of objectives and the general construction of criterion referenced test items. The following guidelines were therefore developed and presented to the writers as specifications for criterion reference items.

Specifications for Criterion Referenced Items

Type 1 - Definition - Identification

Given the instruction to identify the correct purpose of (definition of/description of/use of) concept X, the M will select from several choices the correct purpose of (definition of/description of/use of) concept X.

1. General Type 1
    a. Given the instruction to define concept X,
    b. The M will select from several choices a definition of X
    c. Similar to the following: "X..."

    (NOTE: The third part is optional.)
2. Example of Type 1
    a. When given the instruction to define "acquisition,"
    b. The M will select from several choices the correct definition.
3. Example of Type 1
    a. Given several choices, the M will select the correct definition of acquisition.
4. Example of Type 1
    a. When asked to define "attention,"
    b. The M will select from several choices a statement
    c. (which indicates that attention is the selection of specific stimulus elements).

Type 2 learning is a composite of those intermediate skills which many deem necessary before passing on to higher and more complex abstract operations. Hence the following:

Type 2 - Discrimination - Comparison

Given the instruction to evaluate the relationship between (defining attributes of/contrast between/ comparison among) classes X, Y, Z...N, the M will be able to select from several choices the paragraph which illustrates (describes/differentiates/identifies) the relationship between (defining attributes of/ contrast between/comparison among) classes X, Y, Z...N.

1. General Type 2
   a. When asked to evaluate the relationship among X, Y,...N,
   b. The M will select from several choices the paragraph which describes this relationship.
2. Example of Type 2
   a. When asked to evaluate the difference between retroactive and proactive inhibition,
   b. The M will select from several choices the paragraph which describes this difference.

Type 3 corresponds to the first entry into higher order analysis and a complete break from simple or lower order intellectual activities. Hence:

Type 3 - Generalization - Problem Identification

1. Deductive
    a. Given examples of X, the M will be able to select from several choices the example which illustrates principle Y.
2. Inductive
    a. Given an example of X, the M will be able to select from several choices which principle (X, Y, ... or N) is shown (exemplified/demonstrated) by the example.
3. General Type 3
    a. Given examples of an X,
    b. The M will be able to select from several choices the example which illustrates principle Y.
4. Example of Type 3
    a. When asked to compare several versions of the same communication,
    b. The M will select from several choices the version which clearly links the subordinate's role to the overall objective of Naval operations.

There is general agreement that problem solving, using complex and almost simultaneous operations of analysis and synthesis represents the highest order of learning activity. Thus:

Type 4 - Problem Solving

When asked to evaluate a situation which is an example of class X, the M will select from several choices the correct solution (approach/method/resolution of/ reaction to) the situation, using principle Y.

1. General Type 4
    a. Given a problem situation which is an example of class X,
    b. The M will select from several choices the correct approach to the situation,
    c. Using principle Y.

    (NOTE: The third part may be omitted if the objective is unambiguous. In practice, the third part is usually not given to the student.)

2. Example of Type 4
    a. When asked to evaluate a situation in which there is an apparent failure in communication,
    b. The M will select from several choices the description which indicates the appropriate action of a leader,
    c. Who assumes responsibility for the failure.

Further guidance to the test item developers was the content outline, which is something of a misnomer for the thirteen volumes of substantive and detailed explication of the specialized knowledge germaine to Leadership, Psychology and Management. The primary contribution of the content outline as guidance was the assurance of content validity for the items.

The personnel, outside the main development site, who prepared test items were for the most part, experienced behavioral scientists whose work was later reviewed for military appropriateness.

Other Guidelines

In house, the test items were developed by two man teams which consisted of an educational technology specialist and a subject matter specialist who had primary experience as a naval officer and secondary expertise in at least one of the subject disciplines. There are few hard and absolute rules for test item generation since literary style is often as great a factor in successful test item writing as behavioral expertise. One piece of guidance circulated to writers and abstracted below suggests this point when it cautions that the test item writer have:

> ...an insight into backgrounds, abilities, and particularly the mental processes of the subjects who are to take the tests a facility in the clear and economical use of the language, and above all, an essential willingness to devote the time and energy necessary for the task...

> Some persons, once they have overcome their initial blocking, can produce items steadily day after day... Others, however, are never satisfied to reduce an idea to a reasonably abbreviated statement with the addition of several alternative answers. They can always think of myriad details about which one might wish to have information before committing himself to an answer.

On the relative objectives of the test items and their relationship to the objectives of the course, the following advice was offered.

> The function of the progress checks is to insure that minimal acceptable levels of performance are attained by all students in certain essential behavioral objectives. These objectives are essential either because they form part of the behavioral outcome to be shaped by the course, or becuase they are prerequisites to some later stage of training. Clearly, the progress checks should be at a minimal level of difficulty and closely keyed to the specific behavioral objectives around which the instructional segment is designed. If the item is constructed with content validity at a minimally acceptable level of performance established on an a priori basis, it may then serve as a criterion for evaluating the adequacy of the instructional segment. If subjects miss the item, then the instruction is to blame, not the student. Thus, if part of an instructional segment is to teach the student to discriminate the presence or absence of a particular variable in a social situation, an item explicitly testing that discrimination would be included in a progress check, using an exemplary situation similar to those used in instruction and which "all reasonable men" could agree should be correctly answered if the goals of the course are to be achieved.

Specification for Research Test Items

The development of research test items was predicated on the belief that criterion referenced items and tests (tied to specific objectives) would not be sufficient in measuring either the differences in instructional treatments or the larger intellectual cognitions that would derive from a full semester of intensive study across a variety of subject disciplines. As posited in an early position paper on the posttests [the vehicle for research test items].

> Given that a student attains the minimal levels of performance defined by the progress checks, we may still expect the students to have achieved widely varying levels of ability to generalize to novel situations, to resist interference by similar material presented earlier or later, to integrate new ideas into larger conceptual schemes with broad behavioral implications, and to deal with more subtle and complex examples. The posttests must be designed to pick up the differences in this partial or generalized behavior if we are to determine what kinds of behavior change are produced in those segments of the domain.

In the specifications that were detailed for these research post-test items the following are of interest.

1. Relationship of items to content: Cumulative Posttest (CPT) items will be prepared on the basis of content outlines and the content of "common" instructional materials (i.e., materials presented in each of the parallel experimental modules).

Each CPT item must have an identifiable relationship to one or more general and/or specific headings of the content outlines; references to content outline headings will be noted on each test item submission form.

Each item will be related to the content of as many different segments making up the Cumulative Posttest Unit as is feasible and desirable in relation to other specifications detailed below. The entire set of items should represent an equitable distribution of content among segments of the Unit in relation to the relative amount of content covered by the outlines and the materials of each segment.

3. Item difficulty: CPT items will possess high discriminative power; WLC will endeavor to construct items of relatively high initial difficulty and sensitivity to gain, using the general guidelines that not more than 40% of the students should answer the item correctly on a pre-test, nor less than 50% of the students should answer the item correctly on a Posttest. Actual indices of item difficulty will be determined in the validation testing program at the USNA, as a basis for subsequent item revision.

5. Types of items: CPTs will include items which represent "acquisition of knowledge" (Type I items) and "application of knowledge" (Type II items).

Type I items will measure acquisition of specific factual information covered in one or more segments of a Unit. Acceptable forms of Type I items include definition-identification, discrimination-comparison, multiple discrimination, and concept identification question.

Type II items will measure application of concepts and principles covered in one or more segments of a Unit.

Acceptable forms of Type II items include problem identification (selection of the correct or most appropriate example or illustration of a given concept or principle) and problem solving (selection of the correct or most appropriate solution of a given problem). Each CPT will contain approximately equal numbers of Type I and Type II test items.

Procedures for Revision of Test Items

The general criterion for revision of either test items or materials was the 80% difficulty level of an item. When items fell below the 80% level, the test item, objective, and content were reviewed with respect to the accuracy of their interrelationship. Where discrepancies occurred, subjective judgment determined if the test item or the materials should be changed in order to achieve a closer correspondence to the objective. Where no discrepancy appeared, the following procedures were implemented:

The distribution of responses to each distractor was studied in relation to the materials in order to determine a) if the distractors were in fact correct, b) if the distractors were incorrect but not presented as distinctly incorrect, or c) if the correct answer was not emphasized as correct.

Revision based on these considerations generally consisted of strengthening the controlling stimulus for the correct response by increasing the similarity of examples in the materials and the example used in the test item, or vice versa. Where incorrect distractors were partially or actually correct, subject matter experts made decisions on revising the content outline or material.

When available, the discrimination index of each item was used in conjunction with the difficulty level in deciding revision. Although the difficulty level was weighed more heavily in revision, all negatively discriminating items, regardless of difficulty indicated need for revision. Since negative discrimination indicated that students who scored high or all other items were failing an item, the materials were reviewed to see if in fact the correct answer was the only correct response or if there was another distractor which was also correct. If the difficulty level was 90% or above, a discrimination index was not considered, since only two or three students could cause the discrimination index to be negative. However, if the difficulty ranged between 80 and 90 and the discrimination was negative, the need for revision to either test item or materials was clear.

Although the discrimination indices were not available until after many test items and materials were revised, all progress checks were checked to determine if items that were negatively discriminating or significantly positively discriminating should be revised under the difficulty rule. General guidelines for use of both difficulty and discrimination in revision are given below.

REVISION DECISIONS BASED ON PROGRESS CHECK DATA

Range of Difficulty	Discrimination	Revision	Test Item	Material
90-100	+	No	No	No
	—	No	No	No
	o	No	No	No
80-90	+	No	No	No
	—	Yes	?	?
	o	No	No	No
60-80	+	Yes	?	Yes
	—	Yes	Yes	Yes
	o	Yes	?	?
0-60	+	Yes	?	?
	—	Yes	?	?
	o	Yes	?	?

Since data on item discrimination was not available until late in the revision cycle, it was not possible to fully implement these decision rules and verify their usefulness in the revision process. However, in subsequent guidelines to writers.

Revision of progress checks was based on the 80% difficulty level, the item discrimination index, and the item response analysis. Since these procedures have already been indicated above, this section is limited to revision procedures for the administrative and cumulative posttests.

Administrative Test Revision

The following guidelines were given to writers for the first revision of administrative test items:

1) Identify and revise all items which are above 75% difficulty on the pretest.
2) Identify and revise all items which have less than 75% difficulty if the difficulty of the corresponding posttest item is less than 20% above that of the pretest item.
3) Identify and revise items if the posttest difficulty is less than 70%.
4) Under condition 2 above, revise all items which have negative discrimination indices or which have positive discrimination indices that are significant.
5) Wherever possible, revise administrative items at the same time the corresponding materials and progress check items are revised, and revise materials if they are the cause of negative discrimination or low difficulty.

After all administrative items had been revised and were reviewed by WLC subject matter experts, the items were pretested on two groups of USNA midshipmen, plebes and second classmen. Plebes were tested in order to determine which items were simply too easy. Second classmen were tested in order to determine which items measured objectives that second classmen had already learned.

Specifications given to writers for the second revision of administrative test items were:

1) Work from second class to plebe data. Identify all items which 75% or more second classmen answered correctly. If 50% or more plebes also answered correctly, it is simply too easy and needs to be revised or replaced. If less than 50% of the plebes answered correctly, correctly, leave it alone unless 80% or more of of the second classmen answered correctly. In the latter case, replace the item.
2) Work from plebe to second class data. Identify all items which 50% or more plebes answered correctly. If 66% or more second classmen also answered correctly, it is too easy and needs revision.
3) Use confidence data where it appears appropriate, i.e., if in doubt as to necessity for revision, check the confidence data for second classmen. The percentage of students getting the item correct but indicated no confidence in their response is the percentage who were guessing. However, confidence data should in no way suggest necessity for revision which the item response data does not suggest.

Cumulative Posttest Revision

Since CPT items were constructed to discriminate among students and among modules and since there was no pretest for CPTs, the guidelines for revision of CPTs differed from those for the administrative tests. Guidelines for CPT revision were:

1) Identify all items which are over 85% difficulty or below 40% difficulty. These items will usually need to be revised considerably or replaced.
2) Identify items which are between 75% - 85% difficulty if they contain one distractor which has elicited no responses, and revise that distractor.
3) Identify items which are between 65% - 75% difficulty if they contain two distractors which elicit no responses, and revise either of the distractors.
4) Identify items between 40% - 50% if they contain a distractor which elicits more correct responses than the actual correct response, and revise either the distractor or the correct alternatives.
5) Identify and revise items between the 40% - 80% difficulty level that are negatively discriminating and were not revised according to the difficulty rules.

6) If an item has a significant positive discrimination index, do not revise it.

The foregoing itemization of test item development procedures, from the point of view of the development model, must necessarily be considered in relationship to the management functions for the total process. Considering the large number of test items which were required for such a project the logistics involved in developing them was rather complex. The specific problem, forseen well in advance was the need for articulation between test item development and the other products being prepared for student use. Because of the press of time many of the items had to be generated at least in draft format by consultants who were unfamiliar with the intricacies of the project. While these consultants were furnished copies of the content outline and the terminal and enabling objectives, in addition to specifications for test item construction, experience had indicated that the very nature of this course increased the likelihood that interpretations for content in "soft science" could vary. Thus mechanisms were set up whereby technical assistance to the test item developers was available on a round-the-clock basis. The consultants were encouraged, indeed ordered, to call for technical direction on any point which was open to interpretation. When the test items were delivered, they were carefully reviewed by in-house personnel. Thus continuity and congruence between all materials and test items were maintained.

The number of test items generated, as determined by contract, was to be in number 200% over the number of objectives. Since the number of objectives totaled almost 2,000 enabling objectives, a compromise had to be reached whereby a workable number could be specified for test production. The arrangement that evolved and was agreed upon was that 24 test items would be generated for every segment of instruction. These items would constitute the test item pool from which could be drawn an appropriate selection for the various test. Additionally research test items were generated, approximately 600 in number, which would be later incorporated into the test item pool. Thus for this project over 2,000 test items were prepared in addition to those embedded in the instructional materials themselves. Because much of the material was programmed, and had as a minimum two questions per page, these numbered in excess of 10,000.

This section of the model for course development has concentrated on test development and validation. Some of this process will be continued in the next chapter which represents the final stage of the model - namely, revision. The specific task at hand was to prepare a series of evaluative measures for insuring the performance of the materials and to gain some insight into the relative performance of varying learning styles. While a great deal of discussion centered on the best mechanism for achieving those goals it can be said that the orientation was to a practical rather than a theoretical consideration. Further details on the development and rationale for research and evaluation is available in Part I of this final report (TR 6.18).

VII. REVISION PROCEDURE

Abstract

This section effectively completes the model by discussion of those procedures and methodologies used to refine the performance of instructional materials. It cites examples of data collected and their use in upgrading effectiveness.

VII. REVISION PROCEDURE

This section of the Final Report is not intended to outline the rigorous details for evaluation and research procedures which are reported in Part 1. There is, however, a requirement for the developmental model to describe the procedures and rationale for revision and subsequent production that took place. Furthermore, these procedures and rationale which were reviewed by the customer before implementation helped to allow a smooth transition from phase to phase. Objections, reservations, or additions were usually specified in writing so that there would be no misunderstanding as to customer's priorities.

At discrete points, and at least at the end of each phase, a summary of activities and accomplishments completed was listed. For example, the following seemed significant at the end of Phase II, and were noted.

1. Development and revision of content outlines and objectives.
2. Development of course strategy and presentation design.
3. Development and preliminary revision of course materials for 59 core segments in 8 media.
4. Development and preliminary revision of progress checks.

5. Development and preliminary revision of research tests for 16 units.
6. Development of five experimental research hypotheses.
7. Development of evaluation techniques.
8. Development of data collection and processing procedures.
9. Development of course logistics.
10. Course implementation with 50 midshipmen.

Evaluation data collected fell into objective and subjective categories.

Data and Revision Flow

Objective data for course revision was compiled on the following variables:

1. Administrative pre- and post-tests.
2. Cumulative post-tests.
3. Progress checks.
4. Student confidence ratings.
5. Number of remediations.
6. Questionnaires.
7. Student time.
8. Module frames.

Most of the compilation of data on these variables were done via computer at Measurement Research Center, Iowa City, Iowa. Certain tabulations, however, were performed concurrently by hand at Annapolis. It was convenient to depict the flow of data in chart form, TABLE 23

TABLE 23-1

ADMINISTRATIVE PRE-TESTS

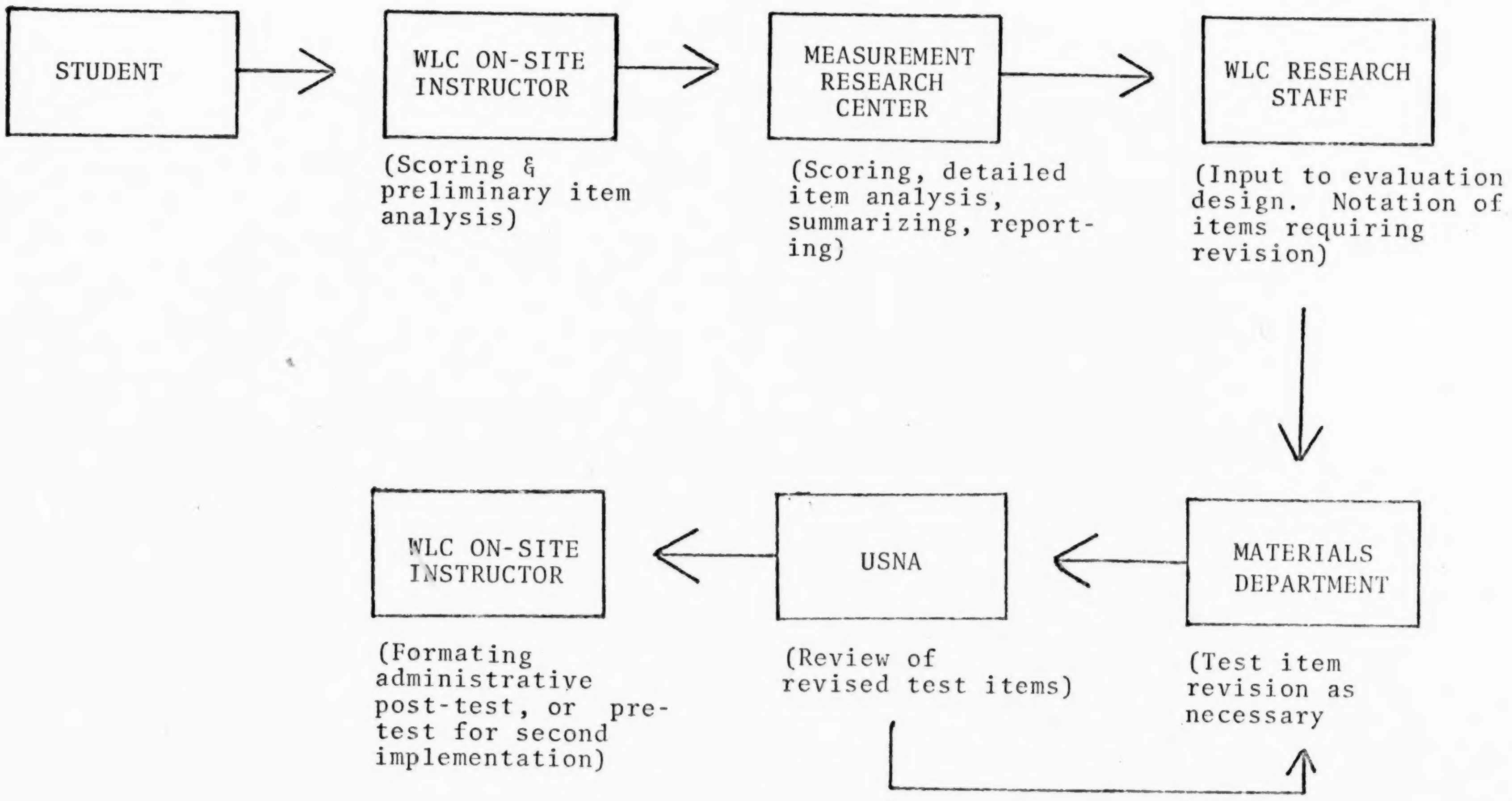

STUDENT
WLC ON-SITE INSTRUCTOR
(Scoring & preliminary item analysis)
MEASUREMENT RESEARCH CENTER
(Scoring, detailed item analysis, summarizing, reporting)
WLC RESEARCH STAFF
(Input to evaluation design. Notation of items requiring revision)
MATERIALS DEPARTMENT
(Test item revision as necessary
USNA
(Review of revised test items)
WLC ON-SITE INSTRUCTOR
(Formating administrative post-test, or pre-test for second implementation)

TABLE 23-2

CUMULATIVE POST TESTS - RESEARCH ANALYSIS

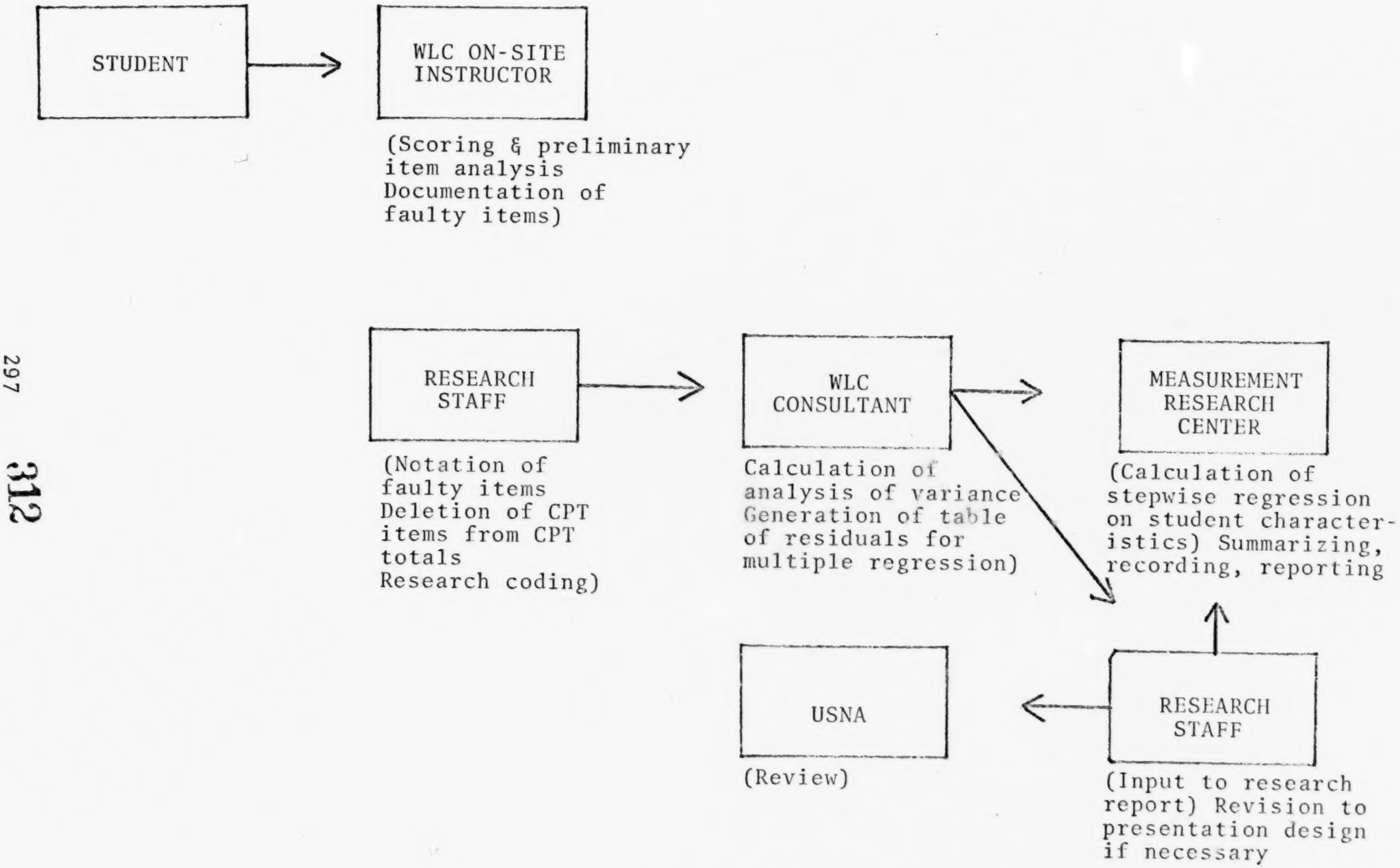

STUDENT
WLC ON-SITE INSTRUCTOR
(Scoring & preliminary item analysis Documentation of faulty items)
RESEARCH STAFF
(Notation of faulty items Deletion of CPT items from CPT totals Research coding)
WLC CONSULTANT
Calculation of analysis of variance Generation of table of residuals for multiple regression)
MEASUREMENT RESEARCH CENTER
(Calculation of stepwise regression on student characteristics) Summarizing, recording, reporting
USNA
(Review)
RESEARCH STAFF
(Input to research report) Revision to presentation design if necessary

TABLE 23-3

CUMULATIVE POST TESTS - REVISION OF TEST ITEMS

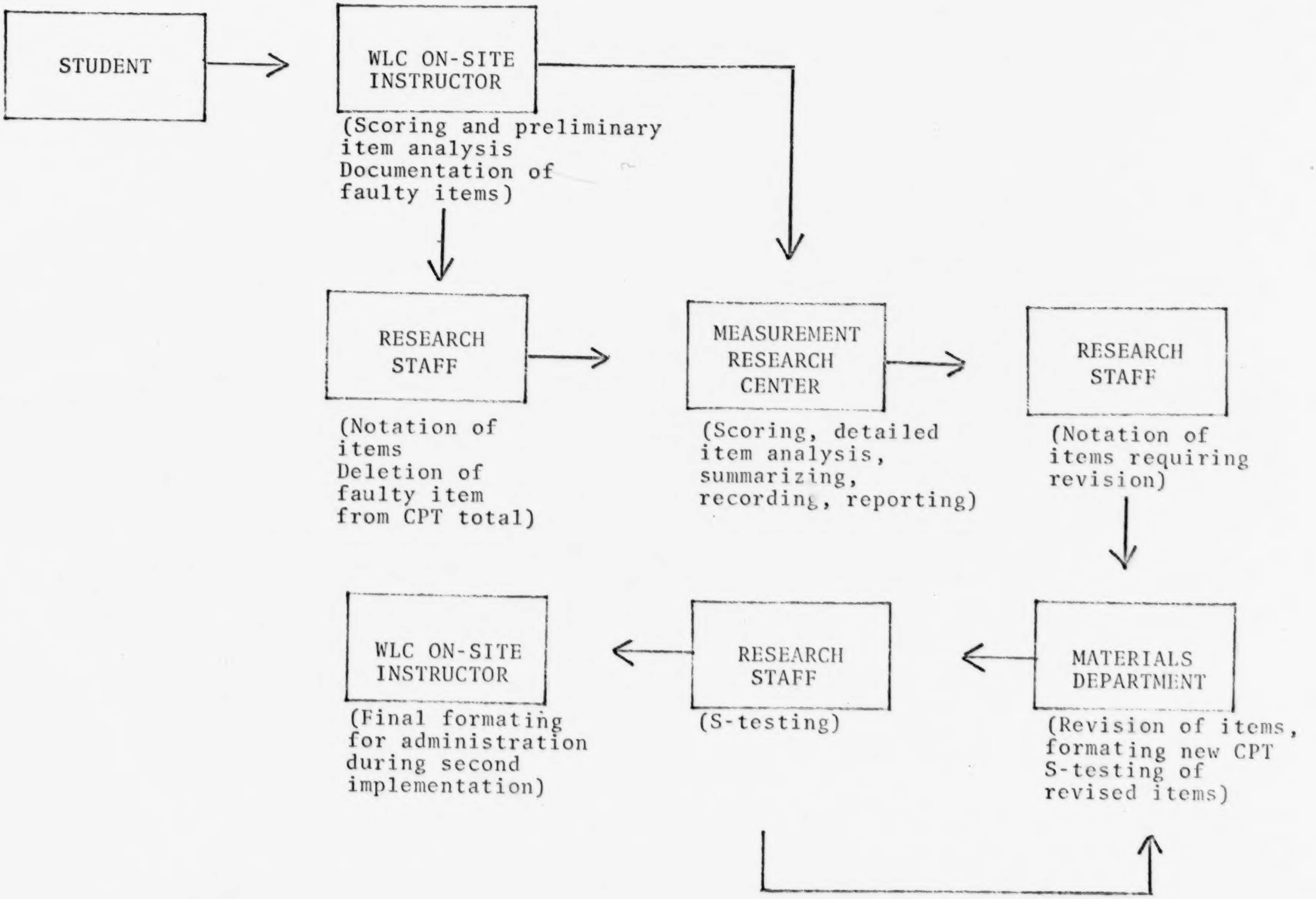

STUDENT
WLC ON-SITE INSTRUCTOR
(Scoring and preliminary item analysis Documentation of faulty items)
RESEARCH STAFF
(Notation of items Deletion of faulty item from CPT total)
MEASUREMENT RESEARCH CENTER
(Scoring, detailed item analysis, summarizing, recording, reporting)
RESEARCH STAFF
(Notation of items requiring revision)
MATERIALS DEPARTMENT
(Revision of items, formating new CPT S-testing of revised items)
RESEARCH STAFF
(S-testing)
WLC ON-SITE INSTRUCTOR
(Final formating for administration during second implementation)

TABLE 23-4

PROGRESS CHECKS, CONFIDENCE RATINGS, ITERATIONS

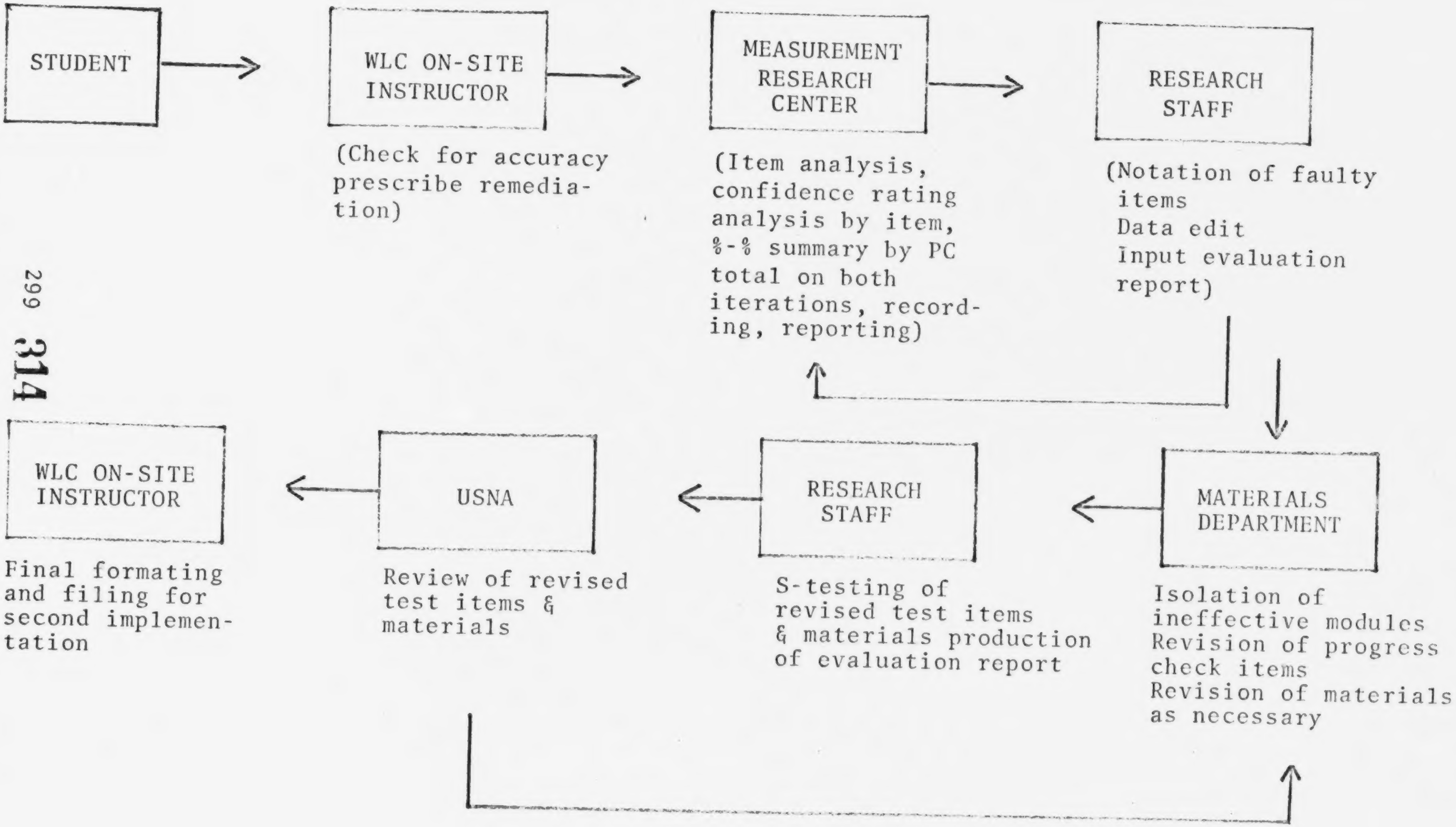
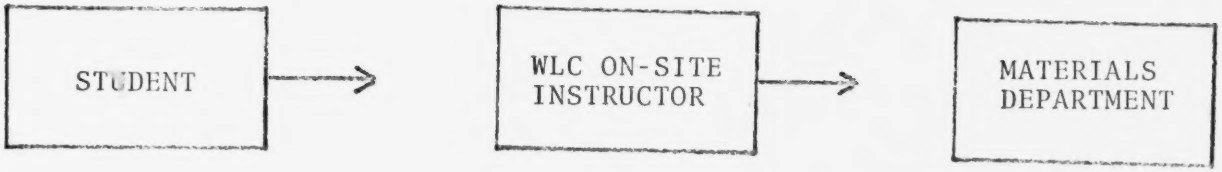

STUDENT
WLC ON-SITE INSTRUCTOR
(Check for accuracy prescribe remediation)
MEASUREMENT RESEARCH CENTER
(Item analysis, confidence rating analysis by item, %-% summary by PC total on both iterations, recording, reporting)
RESEARCH STAFF
(Notation of faulty items
Data edit
Input evaluation report)
MATERIALS DEPARTMENT
Isolation of ineffective modules
Revision of progress check items
Revision of materials as necessary
RESEARCH STAFF
S-testing of revised test items & materials production of evaluation report
USNA
Review of revised test items & materials
WLC ON-SITE INSTRUCTOR
Final formating and filing for second implementation

TABLE 23-5

MODULE QUESTIONNAIRES AND STUDENT TIME


STUDENT
WLC ON-SITE INSTRUCTOR
MATERIALS DEPARTMENT

(Summary of comments
for materials & test
item revision, logging
time)

All data were first checked in-house in order to insure the student's accuracy in completing tests and forms. Preliminary item difficulty was also tabulated at WLC Annapolis for cumulative post test in order to find and delete faulty items which might affect experimental results. CPT items were then re-checked by the Research staff and mailed directly to consultants for analysis of variance within experimental hypotheses.

Test Reports and Statistical Summaries

In all cases, test results for Administrative tests, CPT's, and progress checks were sent to Measurement Research Center in Iowa for recording of data by student, for detialed item analysis, and for summarizing and reporting data back to WLC. After the summary data had been edited within the data files, the edited summaries were reported to the WLC research staff and from there were disseminated to appropriate persons in either the materials preparation department, or the customer course administration staff.

Summary progress check data generated by Measurement Research Center were reported in the form given on page 303.

It can be noted from the sample form that 72% of the students achieved at least 80% of the objectives on their first try. The mean score for the first try was 8.1 on the 10 point test and the average confidence was

7.3. Combining the number of students on the second iteration who scored 80% or better after remediation with those from the first, it can be noted that 36+ 7 = 43 or 86% of the students achieved 80% or more of the objectives. In the sample cited, test items relate directly to objectives and can therefore be viewed as % of objectives attained or failed.

The summary analysis of progress checks was also repeated by module for segments contained within the research design. In other words, it was possible to assess the relative effectiveness of single modules by applying the % - % criterion to each module. A difficulty with reporting percentages for modules, however, was the crudeness of percentages when accumulated on small numbers.

The percent of students attaining a specific objective throughout the course was reported in the form of summaries of item difficulty tabulations with respect to corresponding objective references. An example of the test item objective matrix is presented on the next pages.

SUMMARY ANALYSIS

Progress Checks

PART ONE, SEGMENT I Number of Items = 10

Iteration 1			Iteration - 2		
Percentage Correct	FD PC	Average Confidence	Percentage Correct	FD PC	Average Confidence
100xxx	^{7}14.0	7.6	100xxx	^{4}40.0	8.3
90-99	^{14}28.0	7.3	90-99	^{1}10.0	9.0
80-89	^{15}30.0	7.2	80-89	^{2}20.0	8.2
70-79	^{9}18.0	7.5	70-79	^{2}20.0	8.1
60-69	^{3}6.0	7.1	60-69	^{1}10.0	8.6
50-59	^{1}2.0	8.0	50-59	^{0}0.0	0.0
40-49	^{0}0.0	0.0	40-49	^{0}0.0	0.0
30-39	^{1}2.0	6.4	30-39	^{0}0.0	0.0
20-29	^{0}0.0	0.0	20-29	^{0}0.0	0.0
10-19	^{0}0.0	0.0	10-19	^{0}0.0	0.0
0-9	^{0}0.0	0.0	0-9	^{0}0.0	0.0

Total NCT = 50	Total NCT = 10
Mean Score = 8.1	Mean Score = 8.5
Mean Confidence = 7.3	Mean Confidence = 8.4
72% scored 80% or better	70% scored 80% or better

SUMMARY ANALYSIS

TEST ITEM - OBJECTIVE MATRIX

Part - 1 Segment - 1 Number of Items = 10

Number of Objectives = 10

Iteration - 1

Objective Reference		1	2	3	4	5	6	7	8	9	10
	1	80									
Test	2		70								
Item	3			80							
Number	4				80						
	5					60					
	6						70				
	7							80			
	8								70		
	9									60	
	10										80

Item discrimination was assessed by rank bi-serial correlations of total test score rank equivalents and item correct-incorrect responses. On clarification of the correlation procedures, the format for item difficulty presented was modified to include the discrimination index for each item and the level of significance of the discrimination.

Item analysis data was used in making decisions concerning the revision of test items, the revision of materials, or both.

A fourth type of summary data was the tracking of individual students throughout the course. The sample format for the individual track is given.

SUMMARY DATA

STUDENT TRACK

Student Number

Research Number

Student Name

Administrative Pre Test - 37

			Iteration 1	Iteration 2
Part-1	Segment-1	Module-1	7	8
Part-1	Segment-2	Module-1	6	8
Part-2	Segment-1	Module-1	8	-
Part-2	Segment-2	Module-3	7	9

From the test item-objective matrix, it was a simple process for course writers to determine the exact objectives which were not being clearly presented or tested.

A third type of summary data provided by Measurement Research Center was the item analysis summary for all test items included in the course. Item analysis included item difficulty, distributions of confidence ratings, and item discrimination. A sample summary format for item difficulty is given below.

```
PROGRESS CHECK ITEM ANALYSIS
PART 3  SEGMENT 3   ITERATION 1   NO. ITEMS = 10
ITEM I.D.           ITEM       RESPONSE
                    FD         PC
3401407        A    0           0.0
              *B   44          95.7
               C    1           2.2
               D    1           2.2
NCOUNTS            46
```

(The distribution of confidence ratings is also accumulated for each alternative.)

After the student track summaries had been reviewed by the research staff and the data files had been edited, student track summaries were forwarded to the USNA. It was not at all expected, however, that a student's cumulative scores on progress checks would comprise any portion of his grade.

Subjective data was compiled from three major sources.

1. The student.
2. The on-site instructor and other members of the USNA leadership committee.
3. The WLC course administrators and research staff.

Student-Subjective Data

Subjective student data came in the form of unsolicited student comments, complaints or suggestions, and were considered extremely valuable sources of information for on-the-spot deletion or revision of test items. For example, of the more than 1,000 test items which had been developed, in some few cases students had disagreed with the designated correct answers for items. In these cases, course administrators reviewed the items and made corrections as necessary. Student comments concerning poor test items pre-empted ordinary item analysis compiled after all students had answered the item. The students were highly familiar with the materials at the time of the progress check and were able to indicate weaknesses of the items perhaps more efficiently than a test item writer. Faulty items had been noted according to student comments, and on-going revisions to items were documented.

Student comments and suggestions concerning entire segments of content, material, and forms of presentation were also noted and used in conjunction with hard data as well as other forms of subjective data in reviewing and revising total course materials.

A second important source of subjective data from which information was compiled and studied was that provided by the USNA on-site instructor and members of the Leadership Committee. Input from all professionals in the study of Leadership had, in the past, been used primarily in developing and sequencing the objectives and content for the course, and in reviewing materials and test items for their correspondence to objectives and content outlines. This function of customer leadership groups was still considered important to the extent that there were residual inconsistencies in the content and objectives, but was not expected that there would be input effecting appreciable changes in either content or objectives. In other words, it had been assumed that the direction, substance and detail of the Leadership course had been finalized.

Further subjective imput was to come from the review of revised materials. Also there was some subjective evaluation of the implementation of the course. The evaluation was made with respect to the logistical ease of implementation and the amount of time required for students to adequately achieve the objectives of the course. For example, if it was felt that students in Leadership were spending a disproportionate amount of time studying Leadership, in contrast to the time spent in other subjects, this factor would have to be weighed heavily in the design of the final course product.

Another source of subjective input bearing on course revision was the WLC course administration and research staff. In light of the fact that the first and second implementations of the course were designed to provide information for a tightly constructed experimental design, it was noted that there were many artificial constraints on both students and presentation forms which were then included in the course. Decisions were to come from an interpretation of total findings with respect to both final design and logistical administration.

Revision after the first implementation, a validation test run, set the procedures for subsequent revisions. In summary, specific activities leading to the first implementation were:

1. Specific content for the course was identified.
2. Behavorial objectives were written based on the desired content.
3. Behavorial objectives were sequenced by part and segment.
4. Content outlines were expanded.
5. Behavorial objectives and content outlines were revised.
6. Research experiments were identified.
7. Presentation designs for each part and segment were identified (media and presentation forms for both research and nonresearch segments).
8. Materials were developed according to the presentation design.
9. Test items were developed for all segments.
10. Content, objectives, materials, and test items were revised according to United States Naval Academy recommendations.
11. First implementation began (with 50 United States Naval Academy midshipmen).

The actual development of the course did not proceed as smoothly step to step as the above outline suggests. It can be noted that there were several revision points prior to the first implementation since content outlines and behavorial objectives were revised several times both before and during materials development.

Having determined that the content of the course was as desired, the adequacy of the materials and test items covering the content became the relevant consideration. In order to assess the adequacy of materials and test items and to make appropriate revisions to both, WLC developed the evaluation and revision procedures which are presented in the following sections.

IDENTIFICATION OF SEGMENTS FOR REVISION

The first step in the revision cycle was to collect all data relevant to the identification of segments requiring revision. Data pooling into segment identification are:

a. objective data on segment % - % effectiveness

b. objective data on module % - % effectiveness

c. objective data from module questionnaires

d. subjective data by students

e. subjective data by USNA on-site instructors and members of the Leadership committee

f. subjective data by WLC course administrators

g. subjective data by WLC research staff

The first set of data to be considered was the summary analyses of progress check results. From the summary analyses, all segments in which 80% of the students have failed to meet 80% of the objectives were identified.

Materials in segments which did not meet the 80% - 80% criterion were reviewed and revised. Segments meeting the 80% - 80% criterion were reviewed but were not expected to be revised to the same extent.

Having identified segments which fell below criterion, the second step was to observe % - % achievement for modules contained within faulty segments. By this method it was possible to note that some modules were quite effective, while other ineffective modules tended to lower the % correct for the entire segment. In such cases, ineffective modules were given priority in revision. The research staff was consulted before revisions were made to modules which could affect the experimental treatments in the research hypotheses.

Information from module questionnaires was used as supplementary information for screening segments requiring revision. Answers to questions such as "was the material interesting," "was the material difficult," and "were the questions difficult" were scanned for discernible patterns.

Subjective data from students, such as complaints, comments, and suggestions were helpful in isolating weak segments. Students are invited to comment on segments in writing at the end of the module questionnaire. Additionally, the WLC course administrators kept notes on student comments (oral communications) which related to segments or portions of segments of instruction. In segments where students performed at an acceptable level but were unhappy about the materials, objective data was weighed more heavily. However, for segments which fell below criterion effectiveness, student comments helped to identify general problem areas.

Following identification of segments needing revision, WLC materials revision personnel began identifying the specific test items or portions of material which required revision. Identification of faulty test items and materials was based on the following sources of data.

a. the test item-objective matrix
b. item difficulty
c. item discrimination
d. item confidence ratings
e. student reports by WLC course administrators
f. frame analysis

Test Item Objective Matrix

Analysis of the test item-objective matrix yielded information about objectives which had not been passed by the criterion percentage of students. Since all test items were keyed directly to objectives, the writer's task of isolating the material leading to the test item was greatly simplified. That is, the writer could refer to the specific content covered by an objective or objectives and review the correspondence among content, objectives and test items. By this process, the writer might have noted that there was little real relationship between the three and then noted the need for sharpening the congruity among them.

In cases where the test item and objective did not correspond, the test item was revised in order to reflect the intent of the objective. If the objective and content (material) did not correspond, the materials were revised to adequately cover the intended objective.

To the extent that materials, objectives, and test items all appeared to be related to each other, yet students were failing to meet objectives, analysis was first to be made of the adequacy of the test items. The first source of objective data on test items was the item difficulty index and distribution of student responses over all test item alternatives.

If the difficulty of the test item was high, (i.e., if over 60% of the students answered the item correctly and responses were equally distributed over the three remaining alternatives) the test item itself was considered adequate. In such a case, it was reasoned that if 60% or more of the students were able to identify the correct answer and no other alternative appeared equally reasonable, then the test item itself was probably properly constructed. The next step was to review materials covered by the test item.

If the item was found to be of high difficulty with equal response distribution and the item discrimination index was positive, then it was possible that differences in module presentation account for the lack of percentage correct performance. In other words, it could be that some modules covered the materials related to an objective more effectively than others. In cases of nonresearch segments the identification of test items or materials to be revised was not so clear-cut.

If the difficulty of the test item was high, 50% - 60%, but not over 60%, and the remainder of students all picked the same wrong alternative, then it was possible that the test item: (1) included two correct responses, (2) had two entirely implausible alternatives with two entirely plausible alternatives, or (3) required too fine a discrimination. Materials were reviewed in the first case to decide if both answers were in fact correct or if wrong information was being presented as correct. Otherwise, the test item itself was revised.

If the difficulty level of an item was low (i.e., if 40% or fewer students answered the item correctly, then both test items and materials were reviewed and revised as necessary. In cases of low difficulty, the correct answer may have been keyed as incorrect or a supposed distractor may actually have been a better choice of correct. If the writer was satisfied that the item was correct according to the objective it measured, then materials related to the objective were revised.

Item Discrimination:

The decisions based on discrimination indices were not intended to be inclusive of all possible combinations of item difficulty and item discrimination. They were rather intended as illustrations of the use of objective test-item data in analysis of test items and materials for revision. In some cases, errors in test items and materials were obvious to a writer and he quickly corrected the problem. In other instances, even the item analysis did not help in pinpointing the difficulty and the writer was required to rewrite portions of materials plus develop new test items. Wherever available, pretest data on progress checks was used in diagnosing areas of difficulty in test items.

USNA REVIEW

Following the analysis of data and diagnosis of materials requiring revision, WLC submitted the revised segments for review according to schedule. In submitting materials, WLC specified portions of materials which had undergone major revision. Since WLC was working closely with in-house experts in revising materials, it was not expected that a large portion of the revision burden would be placed on the USNA.

This section of the report basically concludes discussion of the model. Materials revision preparatory to retesting closes the loop which began with definition of content. In many respects the process began again since revision necessitates a relook at the steps leading up to development and student testing. Thus, it is an iterative process where success is achieved through successive approximations towards the desired goals.

Some final notes on the revision process may be in order here. One item concerned with both Chapters VI and VII is the possible determination of a single set of criteria for good test items. It was the experience of this project that no such generalized measures evolved. However, some general considerations were used which were most helpful and worthwhile. The first real evaluation of a test item was done by the subject matter expert to insure content validity. In other words did the test question accurately incorporate the desired content and was the answer specified as correct indeed the most accurate and appropriate possible. At the second stage since most questions were problem solving in nature, was the description described including terminology used a realistic and accurate reflection of a potential leadership situation. There was little attempt prior to actual testing by the subject matter experts to ascertain other characteristics of the test items value. Statistical data would later provide the guidelines on levels of difficulty and discriminatory powers as detailed in both Chapters VI and VII.

Late in the project some criticism arose over the possibility of some items being overcued. At that time all items in the progress check tests were examined to see if terminology was leading as to make the choice obvious, if there were certain simple placement patterns which would cue the student that certain choices could never be correct, or thirdly, if some items were made obvious by such devices as the length of the answer. In the process of this examination some items were changed while others proved to be quite respectable by virtue of frequency distributions recorded for those items.

The following brief section completes this report with some general summary comments.

VIII. SUMMARY AND CONCLUSIONS

Abstract

This brief section summarizes the steps of the model, and briefly evaluates progress made and lessons learned.

The project, therefore, successfully concluded, as the three year effort to advance the practical art of course development yielded both a viable and replicable model and a smoothly performing course system. The additional values that have accrued include the research and evaluation results, and the training of almost hundreds in the systems approach to course development procedures. This experience of an interdisciplinary, systematic methodology has spin offs in giving the educational community a cadre of knowledgable professionals, capable of making additional contributions to educational advancements. For if the educational systems for the 1970's are to meet the needs that are now so desperately obvious, the people as well as the models are necessary.

The research efforts were at first disappointing since the potential for macro specifications for materials development did not materialize. The "no significant differences" reports initially rippled through the project in an almost ominous manner. Outside critics of the project took the opportunity to additionally finger the research as a distractor from the main effort of course development. Again, the research was misunderstood as being superfluous to the project, when in reality it was the contractor's effort to fulfill the requirement to study alternative methods of presentation.

In further reflection, the "no significant differences" took a different meaning when evaluation data showed that overall performance of all methods of presentation suggested that the skill of materials preparation and revision tended to eliminate any differences that might otherwise show. Thus, as reported in PART ONE of this final report,one yield from the research effort points to the need for further research on the skills and techniques of the educational writer. Indeed the repertoire of skills and attitudes in the writer may be of more significance than the competancies of the learner.

Overall, the project seems to conclude with more data of importance as developmental variables (e.g. management and technical skills and attitudes) than as learner variables. While learner variables were studiously sought for, the results at this time were more interesting than practical for individualizing course instruction. Perhaps the difficulty lies with the present taxonomies of variables that encompass skills that are too generalized (e.g. SAT Verbal) or perhaps are totally irrelevant to the predispositions or individually acquired strategies for learning (e.g. agressiveness). Only further study will answer that.

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